HIV on the Move: Sex Differences in Patterns of Migration and HIV in South Africa

by

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Abstract

This dissertation advances knowledge of an under-investigated aspect of gender and health: what are women's unique patterns of migration, and how do they contribute to health risks such as HIV/AIDS in southern Africa? Empirical studies of women's migration are few in number, in part due to data limitations and measurement biases; existing datasets typically still reflect only a small part of female mobility. Research on migration and HIV/AIDS has almost exclusively focused on male labor migration, finding migration to be a risk factor for men and their non-migrant partners, yet often failing to measure the HIV risks of migration for women. Bodies of literature on migration in sub-Saharan Africa have largely presumed a stable female-headed household to and from which male migrants circulate. The very manner in which migration is conventionally studied is shaped by the paradigm of male labor migration, and thus it fails to capture the complexity of women's mobility, and women's increasing participation in migration in Africa today.

This dissertation pursues three sets of questions: 1) How extensive is women's participation in migration in southern Africa? Has it increased? What are its characteristics? 2) What are the major causes of migration in southern Africa, and do they differ for men and women? 3) How has migration influenced patterns of HIV/AIDS infection in southern Africa? Does migration present a higher HIV infection risk to

women than to men? If so, why? I pursue these questions with demographic, social and HIV surveillance data collected from some 45,000 adults since 2000 by the Africa Centre for Health and Population Studies, a research center based in rural KwaZulu-Natal.

Findings of this study are that the use of innovative measures erases any assumed predominance of males in migration, and reveals distinct sex differences in migration patterns. Furthermore, all of those who are more mobile are at higher risk of HIV infection relative to their more stable counterparts, not only the non-residents, disproportionately male, who would in conventional approaches be defined as the population's 'labor migrants'. Moreover, migration has a different impact on the risk of HIV for each sex: women's involvement in migration exacerbates their already disproportionate infection risk relative to men. The influence of higher risk sexual behavior on prevalent HIV infection is modified both by sex and by participation in migration, net of the effects of other covariates of infection. Aspects of the migration experience render its 'behavioral consequences' more hazardous for women. This study points to an urgent need for HIV prevention efforts in the population, and highlights the particular vulnerability of migrants, especially female migrants, to HIV/AIDS.

Chapter 1
Introduction

The study of migration is, after that of fertility and mortality, fundamental to demography. Yet, unlike the other two pillars of the field, migration has only recently, and to a limited extent, been subject to analysis through the lens of gender. Empirical studies of women's unique patterns of migration are few in number, in part due to data limitations and measurement biases. Existing datasets, such as national censuses, typically still reflect only a small part of female mobility. Bodies of literature on migration in sub-Saharan Africa, across several disciplines, have largely presumed a stable female-headed household to and from which male migrants circulate. The historical, sociological and anthropological literatures are rich in documentation of the effects of colonial and post-colonial male labor migration systems on household arrangements, land use and agricultural practices, relations between men and women, the political power and social status of elder males in rural areas, and to a less extent, the status of women in these areas. Yet, to paraphrase van Onselen (in his account of the domestic labor market of the Witwatersrand; van Onselen 1982), it is largely in vain that one scans the literature for accounts of women's migration and its effects on households and families; there is little beyond a few local surveys to break the monotony of the bleak academic landscape.

Migration theories, concerned largely with explaining macro-level "push" and "pull" factors that drive patterns of international migration, do not encompass frameworks for understanding the role of gender in producing the diverse contours of population movement across or within national borders; nor do economic migration theories consider the ways in which changes in gender (e.g. in family structure, marriage or social norms related to men's and women's gender roles in the household) may influence the labor market dynamics that drive population mobility. Feminist economists (e.g. Posel 2001) have critiqued micro-economic models of household decision-making that presume an altruistic male household head who rationally selects the 'best' migrant to send for the benefit of the overall household. Their scholarship points to alternative household structures, shared decision-making, conflict, and selfish motives on the part of male household heads, as factors that problematize these models and reveal their gender bias; yet no new household migration decision-making models incorporating gender have emerged.

In the public health literature, research on migration and HIV/AIDS has almost exclusively focused on male labor migration, extensively documenting its role in the spread of the epidemic, and at the individual level, finding migration to be a risk factor for men and their non-migrant partners (e.g. Jochelson, Mothibeli et al. 1991; Pison, Le Guenno et al. 1993; Decosas 1998; Lurie, Williams et al. 2003; Lurie, Williams et al. 2003) yet failing to measure the HIV risks of migration for women.[1] Across various literatures, the very manner in which migration is conventionally studied is shaped by the

paradigm of male labor migration. It thus fails to capture the complexity of women's mobility, and women's increasing participation in migration flows, both within and across various borders in sub-Saharan Africa today.

This dissertation is an attempt to address some of the problems and unanswered questions in the scholarship on migration in sub-Saharan Africa. It is composed of three distinct, yet inter-connected intellectual projects, pursuing three sets of questions:

1) Is female migration still under-researched? How extensive is women's participation in migration in southern Africa, and has it increased in recent times? What are the characteristics of female migration in southern Africa, and how do these differ from the features of male migration in the region?

2) What are the major causes of migration in southern Africa, and what socio-economic, demographic and household characteristics predict the migration of men and women? Do these factors differ by type of migration, and by sex?

3) How has migration influenced patterns of HIV/AIDS infection in southern Africa? Does migration present a higher HIV infection risk to women than to men? If so, why?

To address these questions, I critically review of literatures across several disciplines and pursue original empirical analysis of data from a demographic

surveillance site in KwaZulu-Natal, South Africa. The Africa Centre for Health and Population Studies collects detailed demographic, social and behavioral data in a population of over 70,000 individuals. In 2003, it launched an HIV surveillance project, enabling the annual collection of HIV serological data for all participating adults, and the linking of these with other individual level data. The analyses carried out for this dissertation uses data from the Centre for time periods encompassing the years 2000 through 2006.

This document is organized as follows: In Chapter 2, I examine the evidence for a 'feminization of migration' in southern Africa, providing an overview of major issues in the literature on gender and migration, synthesizing the findings of the extant research on sex differences in patterns and trends and highlighting gaps in the literature. I summarize the problems with the measurement of migration in commonly-used data sources, and how these have influenced the extent to which female migration has been characterized. I then present findings of an analysis of sex differences in the types and patterns of migration and mobility in KwaZulu-Natal. The more nuanced measures used in this study from a demographic surveillance system, including measures of in-, out- and internal migration and recent household presence pattern within a local predominantly rural area, erase any assumed predominance of males in migration, and reveal distinct sex differences in the patterns and types of migration.

Chapter 3 provides a critical review of literatures on gender and the structural and individual determinants of migration, focusing on southern Africa. To explore questions

related to sex differences in the factors that influence migration, this chapter shows findings of "migration decision" models for men and women, using a range of measures of migration and mobility as dependent variables in logistic regression models, again using recent data from KwaZulu-Natal. This chapter shows that the determinants of migration events vary by the type of migration event, whether it be a local migration, a migration away from the rural area, or a return-migration to it. Moreover, the factors that precipitate or constrain migration are by no means the same for men and women. The findings shown in this chapter support the notion that gendered opportunity structures- both those related to labor and marriage markets, and to the gendered social norms that influence the role expectations and behaviors of women and men- are actively implicated in producing sex differences in patterns of migration in rural South Africa. The level of mobility in this population is extraordinarily high, and gender is intrinsic to the social transformations that both fuel this mobility and are fueled by it.

Chapter 4 turns towards an exploration of gender and the health consequences of migration, specifically for the HIV/AIDS epidemic in KwaZulu-Natal. The chapter shows findings of an empirical analysis of sex differences in the HIV infection risk associated with migration, and explores causal mechanisms for those sex differences. The findings in this chapter highlight the importance of using detailed, rather than global, measures of migration in order to fully capture the risks of HIV that are associated with migration and mobility. All of those who are more mobile are at higher risk of infection relative to their more stable counterparts, not only the non-residents, disproportionately

male, who would in conventional approaches be defined as the 'labor migrants' of the population. This study shows a striking sex disparity in HIV prevalence, with young women at a three-fold infection risk relative to their male counterparts.

The most important finding shown in the chapter, however, is that sex modifies the effect of migration on HIV infection risk: women's involvement in migration exacerbates their already disproportionate HIV infection risk relative to men. The sex composition of the population of migrants cannot account for the finding that recent migration presents a greater risk of HIV infection for women than it does for men. Moreover, further analyses revealed that although migrants of both sexes engage in higher risk sexual behavior than their non-migrant counterparts, a given level of sexual risk behavior leads to a greater risk of infection for female migrants than it does for female non-migrants (or for male migrants and non-migrants). The influence of higher risk sexual behavior on prevalent HIV infection is modified both by sex and by participation in migration, net of the effects of other factors that predict infection. Some aspect of the migration experience— unmeasured in this study— renders its 'behavioral consequences' more hazardous for women. The dissertation concludes in Chapter 5 with a summary of key findings and a discussion of the implications of the findings for research, policy and public health practice in southern Africa.

Notes

[1] To my knowledge, of the at least thirty empirical, population-based studies of HIV risks associated with migration in sub-Saharan Africa published in the peer-reviewed literature, only the following directly measured the HIV risks associated with migration for women: Boerma, Urassa, et al. (2002); Zuma, Gouws et al. (2003); Lydie, Robinson et al. (2004); Coffee, Garnett, et al. (2005); and, Kishamawe, Vissers, et al. (2006); the main findings of these studies are discussed in Chapter 4.

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Chapter 2

The Feminization of Migration in Southern Africa

Introduction. That female migration is generally under-researched was first recognized some twenty years ago, when the Population Division of the United Nations (UNPD)[i] convened an Expert Group Meeting on the "Feminization of Internal Migration" (Bilsborrow 1992; Hugo 1993) in preparation for the 1994 International Conference on Population and Development. Primarily concerned with elucidating the conditions under which migration can lead to improvements in the status of women, the Expert Group identified broad issues and questions related to the study of women's migration that remain relevant today. This chapter revisits the call to action that the group proposed, to first ask, twenty years later, is female migration still under-researched? What is known about the more recent levels of participation of women in international and internal migration in sub-Saharan Africa? How do the features of female migration in sub-Saharan Africa differ from those of male migration? Is there convincing evidence for a 'feminization of migration' in the region? What problems and measurement issues are encountered when we pursue these questions? To this end, I review literatures on female migration that have emerged in the past two decades, extending the scope of investigation beyond the field of population studies; yet I focus on the research from southern Africa, where the degree of exclusion of gender and women's unique patterns of mobility in the scholarship on migration is particularly striking.

The second part of this chapter represents an attempt to begin to fill some of the gaps I have identified in the literature, using the case study of a population of some 50,000 adults living in a primarily rural, 450 square-kilometer area of KwaZulu-Natal, South Africa. I describe the features of migration and mobility in the adult population, and present an analysis of sex differences in the patterns and determinants of migration in the population, using detailed demographic surveillance data collected in the years between 2000 and 2007. With these data, I demonstrate how the ways in which migration and mobility are defined and measured produce widely divergent views of the extent of women's involvement in migration. The data reveal distinct sex differences in the types, frequency and extent of various patterns of mobility in the population, and also show how men's and women's individual and household characteristics shape their likelihood of mobility.

Any reviewer of literature on gender and migration from the past two decades will be struck by the frequency with which it has been noted that female migration is under-researched, poorly measured, and poorly understood (e.g. Pedraza 1991; Bilsborrow 1992; Chant and Radcliffe 1992; Hugo 1993; Todes 1998; Dodson 2000; Casale and Posel 2002; Zlotnick 2003; Dodson and Crush 2004). A body of historical and anthropological literature since the 1970s on women in Africa provides rich detail on the lived experience of female migrants since the colonial area, confronting the exclusion of women from the central canonical narratives of Africa in these disciplines. And, a body of literature on gender, migration and development emerged in the early 1990s that was largely concerned with highlighting male gender biases in the extant literature,

interrogating the theoretical bases of approaches to the study of migration, and raising awareness of the importance of gender for understanding the social processes involved in migration. Yet, analyses of actual empirical data on sex differences in migration patterns, or specifically investigations of the levels and trends in female migration, are few in number, particularly for the sub-Saharan African region. Where these studies exist, the researchers emphasize limitations of their data sources and a range of measurement biases. The small but growing body of research on recent levels of involvement of women in migration in southern Africa - both international and internal- is reviewed here, along with historical and anthropological accounts which help to contextualize this investigation.

The sex composition of international migration flows in sub-Saharan Africa. Using estimates produced by the United Nations on the basis of national census data collected since 1970, Zlotnick (Zlotnick 2003; Zlotnick 2006) has shown that globally, the number of female migrants has been large and increasing, both in number and as a proportion of the world's migrant stock. The total number of migrants in the world increased from 82 million to 175 million between 1970 and 2000; and in 2000, about half (48.6%) of the world's international migrants were women (Zlotnick 2006).

In sub-Saharan Africa, while a significant number of women and children are 'forced migrants' who have fled conflict, persecution, environmental degradation, natural disasters and other situations that affect their habitat and livelihood, most female migration is voluntary. (Zlotnick 2003) Compared to other regions, the absolute number of international migrants in Africa has remained moderate, its increase has been modest and, since 1980, the continent's share of the world's migrant stock has been declining

(Zlotnick 2006)(p. 25), despite Africa's growing population, which has more than doubled since 1970 and 2000. The surprisingly low levels of international migration from Africa have been ascribed to high poverty levels and consequent constraints to mobility (Kok, Gelderblom et al. 2006). Zlotnick's analysis suggests that over the past several decades, the sex composition of the migrant stock in Africa shifted. Males still outnumber females among international migrants in sub-Saharan Africa; yet, of all of the world's regions, the increase in women's share of the total international migrant stock was highest in sub-Saharan Africa, having risen from 40.6 percent in 1960 to 47.2 percent in 2000 (Zlotnick 2003).

The body of historical research on women's mobility in sub-Saharan Africa is large enough to suggest that to a great extent, women have been 'on the move' in the region since at least the beginning of the colonial era. In their report on the 2002 South African immigration policy, Dodson and Crush remarked that:

> Far from being those 'left behind', or migrating merely as dependants, African women have been practising independent migration across the borders of Southern Africa for decades (Bonner 1990; Walker 1990; Miles 1991; Cockerton 1995; Coplan 2001; Barnes 2002). Historical research such as Bonner's (Bonner 1990) work on Basotho women on South Africa's Witwatersrand between 1920 and 1945 documents migrant women's activities in beer brewing, cooking, laundry and sex work. Miles (1991) and Cockerton (1995) describe the migration and employment histories of women who migrated from colonial Swaziland and Bechuanaland (Botswana) to South Africa. (Dodson and Crush 2004)(p.99)

These sources are joined by Van Onselen's history of South Africa at the turn of the past century, describing women's migration to the Witwatersrand in the late 19th and early 20th century to participate in the new colonial economies surrounding the mines, working

as prostitutes and supplanting males in the role of domestic servants (van Onselen 1982). Other sources reinforce the proposition that the domestic labor sector underwent a feminization throughout eastern and southern Africa as the colonial era progressed, drawing increasing numbers of women away from rural homesteads throughout the region: Bujra (Bujra 2000) documented the processes of female migration for work in domestic service in colonial Tanzania. White (White 1983) documented the active role women played in the development of colonial Nairobi, reframing the concept of 'prostitution' to encompass a range of strategies women undertook to claim space and citizenship in the new urban spaces created under colonialization.

Chauncey's account of female labor in the 'Copperbelt' (Chauncey 1981) describes the colonial capitalists' policy of permitting women to reside at the copper mines (in contrast to the more stringent rules excluding women and children from settlement at the gold and diamond mines of the Witwatersrand). This experiment was designed to permit Copperbelt mines to compete with the Witwatersrand for male labor while providing lower relative wages. Capitalist authorities fully expected that miners would bring their wives, but defying colonial restrictions, a wide variety of women migrated to the mining areas, developing a niche in beer-brewing and other informal sector work. The result was the growth of a very urbanized class of people in Northern Rhodesia (now Zambia) throughout the 20th century.

To be sure, South Africa's migrant labor system, which was a cornerstone of both colonial- and apartheid-era economies, was built upon on the labor of males. This helps to explain why the earlier body of sociological research on migration in sub-Saharan Africa unambiguously, for the most part, described the migrant as male and assumed that

females were static residents of the rural areas of the region (e.g. Fortes 1971; Little 1974; Murray 1976; Sabor 1979; Mayer 1980; Murray 1980). Feinstein (Feinstein 2005) described how from its beginning through the end of apartheid, South Africa's governmental policies were driven by a central concern: obtaining the cheap labor of black men in order to support the privileged economic and political position of whites. The South African colony was characterized by abundant land and scarce labor; yet rather than to permit market forces to generate labor supply (i.e. through raising African wages), the labor force was obtained through coercion: prior to the apartheid era, the government enacted a century or more of laws and statutes to disenfranchise blacks, dispossess them of lands, and enforce their labor in white-owned farms, mines and other businesses (ibid.). White racist ideologies were further reinforced and codified after 1948, when the National party won the election and began to set up the legislative structure that was apartheid. Over the decades of the 20th century, migrant labor was reinforced by taxes and restrictions on land ownership and capital investment in agriculture in the rural "reserves" (later "homelands") where blacks were permitted to reside.[ii] These areas were periodically reduced in size even as the black population grew, resulting in environmental degradation and deteriorating agricultural production on the lands over time; this further reinforced migrant labor, without which black households could not survive.

This pattern repeated, beyond South Africa's 'homelands', in the male migrant 'sending' areas such as Lesotho, Swaziland, Mozambique and Botswana. While men from these areas were recruited for their labor in the mines of the Witwatersrand, South Africa's influx control laws specifically excluded women (Wilkinson 1983). At the same time, arable land became scarcer in sending areas such as Lesotho, and the burden of

agricultural production, falling exclusively upon women, became heavier. According to Spiegel (Spiegel 1981), a new system of land tenure implemented in 1979 further eroded the means of subsistence in Lesotho: access to arable allotments became more limited there, as had happened earlier in the South African 'homelands'. At the same time, under the cost-cutting measures of new 'stabilization' schemes of South Africa's Chamber of Mines in the late 1970s, recruitment of migrant laborers became more selective, resulting in higher wages, longer contracts, and less skilled labor (Ibid.). More men were excluded from wage labor, resulting in higher male unemployment not only in South Africa but in surrounding migrant 'sending' areas.

The causes of the economic crisis that erupted in the 1980s in South Africa were deeply rooted in colonial and apartheid labor policies. According to Feinstein, the paradox of scarce labor and low wages, and the under-development of a local (intra-national) market for goods due to under-investments in education for blacks, resulted in a "chronic disease" in the South African economy—which could not be cured by mining exports of gold and diamonds. According to Feinstein, economic collapse was inevitable:

> For three centuries since settlers arrived in South Africa, the dominant theme in all economic discourse had been a shortage of manpower. There was an incessant coercion of black people to supply the labour required by white-owned farms, mines and factories. But by the 1970s this position was beginning to change radically. […] The central problem was no longer the inability of employers to find workers, it was the inability of workers—especially those who were unskilled—to find jobs. (Feinstein 2005)p.237)

The economic crisis worked in tandem with the international and domestic anti-apartheid movements to eventually bring about the regime's demise. Yet the economic trends set into motion over decades of colonial and apartheid-era oppression have not

found simple resolution despite political changes: the levels of unemployment in South Africa today represent "a human tragedy on a staggering scale" (Feinstein 2005)(p. 238). Between 1980 and 1996, the potential labor force, according to census data, increased by almost 4.5 million; and almost all of these (4,170,000) became unemployed (ibid.). If 'ultra-discouraged workers' are taken into account, some 6.3 million South Africans, the majority of whom were black, were unable to find work in 1996.[iii]

In the context of declining economy, the male migrant labor system in South Africa did not produce a stable population of women "left behind" to maintain rural homesteads; in contrast, it appears to have facilitated women's participation in internal migration in the 'sending areas'. If a feminization of internal migration in South Africa truly began in the 1970s, it accelerated over the 1980s and 1990s as South Africa's economic situation worsened: temporary labor migration (in which the migrant does not move away permanently, but returns periodically to the household of origin) increased in the 1990s, driven particularly by women's increasing participation (Casale and Posel 2002). According to several accounts, the depletion of males who migrated to South Africa, and shrinking arable land, led to an increased rural-to-urban internal migration of women in the southern African 'sending' nations, resulting in skewed sex ratios in towns as early as the 1970s (Spiegel 1981; Wilkinson 1983). A similar phenomenon occurred in South Africa's migrant 'sending areas': Preston-Whyte and Sibisi's (Preston-Whyte and Sibisi 1975) work on changing patterns of land allocation among the Nyuswa-Zulu in South Africa in the same period documented a dramatic sex ratio imbalance in the towns of the 'Valley of 1000 Hills'. Their account demonstrated how apartheid policies displaced people and enforced men's involvement in wage labor, but was also set up in

such a way that a rural home was also necessary for male migrants—especially as risk insurance in South Africa's volatile labor market. Traditional practices of land allocation also changed, as land shortages increased: patrilocality was disrupted as married daughters in the area return and claim land for rural homesteads (Ibid.). Yet both married and unmarried women migrated from these homesteads to the peripheries of employment centers to seek opportunities for income-generation. This body of anthropological and rural sociological literature documented, without a great deal of commentary, an involvement of women in migration flows from rural areas; but not a strictly rural-to-urban migration, as the destinations of female migrants were not cities per se but rather towns, peri-urban or semi-rural employment zones, or the informal peripheries of cities, all of which would have been closer to the rural homesteads to which women remained tied.

Using survey data collected from men and women in neighboring countries on their experiences of migration to South Africa, the 'Southern African Migration Project' yielded one of the only sources of population-based survey data on sex differences in international migration patterns in southern Africa. This project focused on the recent patterns of movement to and from South Africa, which, even after economic restructuring and crises in South Africa since the 1980s, remains the primary migration destination for the bulk of international migration in the southern African region. Dodson's (Dodson 2000) analyses of data from the project, collected in 1997 from 2,300 adults (including 1,014 women) from Lesotho, Mozambique and Zimbabwe, showed that a higher proportion of males (47%) than females (36%) had ever migrated to South Africa. Yet these rates of female migration were surprisingly high, given the restrictions on labor

migration to South Africa that have disadvantaged women (Dodson and Crush 2004)[iv]. The sex composition of migrants to South Africa varied widely by country of origin: in Lesotho, 76% of females and 86% of males had ever migrated to South Africa, while in Zimbabwe those figures were 25% of males and 20% of females, and in Mozambique 41% of males and only 9% of females, respectively.

Beyond these historical and more recent demographic studies, few data have been published on patterns and trends in women's involvement in international migration in sub-Saharan Africa. Review articles, such as Pedraza's (Pedraza 1991) review of the extant literature on gender, international migration and the patterns of labor market incorporation of female immigrants in various world regions, have tended to not to focus on sub-Saharan Africa, perhaps because of a paucity of empirical data and published studies. Pedraza commented that the exclusion of women and gender in research on international migration was ironic, noting that females had out-numbered males in migration streams to the United States for decades, and comprised an increasing share (in many cases at least half) of immigrants to several countries in South America, the Persian Gulf and West Africa (Ibid.). She offered, uncited, the proposition that "whereas in Africa men predominate in migration to the cities and women remain in rural areas to farm the land, in Latin America, the Caribbean, and Philippines, most migrants to cities are women." (p. 310) Yet, citing Gugler's (Gugler 1989) commentary on changing patterns of migration in the sub-Saharan Africa, "Women stay on the farm no more", she acknowledged that "profound change can take place over time" (Pedraza, p. 310). In turn, Gugler's review offered little in the way of new empirical data on female migration in the region, offering only the observation that urban employment trends were suggestive of an

increase in female labor force participation, and commenting that "an increasing number of women are establishing themselves in their own homes and with their own careers" (Gugler, p. 352).

In summary, historical and anthropological research has documented extensive female involvement in cross-border migration since at least the colonial era, as everywhere, it seems, women were moving to claim space, seek opportunities and strategize to improve their livelihoods and those of their families, often in resistance to both colonial authorities and the often patriarchal rural authorities of family and community in rural 'sending' areas. That these accounts have documented women's involvement in labor migration within and across the borders of sub-Saharan Africa over decades since the beginnings of colonial settlement is a fact not fully appreciated in the bodies of literature on migration in Africa. Historical and anthropological sources have amply documented the cross-border migrations of women over the past two centuries, but the literature employing empirical, population-based data on patterns and trends in international migration in southern Africa by sex remain quite limited. The available data suggest that males still outnumber females among international migrants in sub-Saharan Africa, but that women's level of participation in international migration flows from the region has been increasing and is now almost on par with men's, despite greater legal barriers to their participation in labor migration. Moreover, the economic crisis that began in the 1970s in South Africa appears to have played a role in stimulating female internal migration in the migrant 'sending areas' both surrounding and within South Africa.

The sex composition of internal migration in sub-Saharan Africa. In contrast to the small body of research on gender and international migration, a somewhat greater

level of attention has been brought to bear on gender and women's participation in internal migration flows, although for sub-Saharan Africa this literature remains relatively small. The empirical measures upon which most studies rely are census measures of migration across various intra-national boundaries, and measures of trends in urban-rural sex ratios. Landmark publications on female migration, the UN Expert Group's preliminary and final reports (Bilsborrow 1992; Hugo 1993) undertook not only to outline many of the essential problems and research gaps pertinent to measuring the extent of women's involvement in internal migration, but undertook analyses of census data and presented, as well, survey data for a set of case studies of selected countries in the 1960s and 1970s (of which Mali was the only sub-Saharan African country selected.) The panel was not able to carry forward an analysis through the 1980s as the data were not yet available at the time.

The UN group concluded that over the 1960s and 1970s, while in Eastern and Southeast Asia the evidence overall pointed to an increasing feminization of net rural-to-urban migration, and while in Latin America, females predominated in net rural-to-urban migration (yet not at an increasing rate over the period), males predominated in this migration flow in the African countries for which data were available. While it noted that rural-to-rural migration predominated in internal migration flows in most regions of the world, "the results of studies dealing exclusively with rural-to-urban migration, which had predominated in the literature, might not be representative of the true impact of migration on women as a whole" (Bilsborrow 1992)(p.141). The group's final report concluded that the relative participation in different types of internal migration flows tends to change over time and in conjunction with processes of urbanization:

> As countries develop, their level of urbanization increases and internal migration shifts from being predominantly rural-rural to being more concentrated in rural-urban movements until it eventually becomes dominated by urban-urban flows. As those changes take place, the distribution of internal migrants by sex tends to become more balanced, whether it began with a highly unbalanced situation favouring men or one favouring women. (Bilsborrow and Secretariat 1991)(p. 5)

More recently, studies using smaller population-based survey and demographic surveillance data from sub-Saharan Africa provided estimates of women's levels of involvement in internal migration flows that were higher than the UN group's earlier estimates from census data. Tienda and colleagues' "Africa On the Move" volume (Tienda, Findley et al. 2006) featured the findings of Collinson and colleagues' analyses of men's and women's unique patterns of migration in a rural area of Limpopo province in South Africa. Data from this demographic surveillance site indicated a three-fold increased in female migration between 1997 and 2001; the most mobile category of residents was women aged 15 to 25 (Collinson, Tollman et al. 2003; Collinson, Tollman et al. 2006). Similarly, data from another demographic surveillance site in KwaZulu-Natal, South Africa has also shown a preponderance of young women among the most mobile category of residents: in 2001, in the most mobile age group, the early 20's, approximately 6 out of 10 women and 4.5 out of 10 men changed residency or 'moved' in 2001 (Hunter 2006). The high mobility of young women over the 1990s appears to extend beyond South Africa: in Tanzania, a population-based longitudinal study found that 10% of men and 12% of women surveyed in a rural population moved (i.e. had at least one change in residence) each year between 1994 and 1998. Rates were higher among women than men under age 25; over age 25, rates among males and females were

the same (Boerma, Urassa et al. 2002).

Further evidence of a high level of mobility of young women is found in studies of internal labor migration and the sex composition of the labor force in South Africa. In their work on trends towards a feminization of the labor force in South Africa over the 1990s, Posel and Casale estimated, on the basis of cross-sectional population-based survey data, that internal labor migration rates in South Africa increased from 33% to 36% in just the period between 1993 and 1999, and that increase was solely due to an increase in the proportion of women migrating for work (Posel and Casale 2003). Over the same period the percentage of African female adults who were migrant workers increased from 7% to 9%, and who were male migrant workers decreased from 15% to 10% (Ibid.).

In her study of gender, migration and regional migration policy in southern Africa, Todes (Todes 1998) showed census data on trends in migration in and out of greater Newcastle, a cluster of a formal town, and a group of townships and informal settlements in northern KwaZulu-Natal. The purpose of her study was to examine what happened in South Africa's peripheral, regional towns with weak or declining economic bases, after apartheid influx control measures were lifted in 1986. Influx Control was abolished "after a period in which it had broken down as people defied laws and streamed to the cities" (Ibid., p. 311). A neo-liberal assumption had been that these "artificial" towns and peripheral industrial areas, created by apartheid through forced removals and influx controls, would "wither away" after apartheid as people continued to migrate to urban areas. However, in contrast to this assumption, the town experienced a net in-migration in a context of stagnant economy, and this net in-migration was concentrated in what

formerly had been designated as African areas. Despite major re-structuring in the 1980s and loss of thousands of jobs, the area's population grew at 3% per annum between 1980 and 1991, compared to natural increase of 2% in the period; and the population growth rate in the former African areas were higher at 4%. Some two-thirds of the net in-migration was by women. The remainder of this report reviews prior research and uses qualitative data to discuss the potential reasons why African South Africans remained tied to the Newcastle area despite declining local job prospects. These are numerous, ranging from difficulty finding work and fears of violence in the cities, men's desire for greater control within their homes and over their wives, and the values of maintaining the rural home as 'risk insurance' and as a place of retirement. What is implied in this report, but not explicitly documented, is that peripheral townships such as Newcastle have maintained their importance as focal points from which households send temporary circular migrants: "Newcastle has acted in a way often described for rural areas, that is as a "home base", or area of social reproduction, from which forays in search of employment and income are made by selected members of the household." (Todes 1998)(p. 317.) In this account, changing economic conditions have both constrained male migration and facilitated changes in attitudes towards sending a female migrant in recent times: confronting "older prejudices", "families on the whole did not seem to prevent daughters from moving, and in fact were frequently supportive of their daughters." (Ibid., p.325)

Two recent volumes on migration in South Africa (van der Berg, Burger et al. 2002; Kok, Gelderblom et al. 2006) provide an overview of recent patterns of migration in the nation and a comparison of overall trends and patterns to other countries and

regions, Despite comments that "female migration as a family survival strategy has […] intensified" (Kok, Gelderblom et al. 2006, p. 17), and the finding that, in South Africa in 2001-02, some 42% of citizens of African origin have ever moved from one magisterial district to another, and 51% of these internal migrants were female (Wentzel, Viljoen et al. 2006), neither volume presents an analysis of patterns or trends in internal migration by sex, nor are there any chapters which undertake to present information or commentary on gender and migration or women's migration in particular.

To date, moreover, no major volume on female migration in sub-Saharan Africa, either in specific countries or the region overall, has emerged.

In summary, empirical evidence of sex differences in internal migration patterns in specific countries of sub-Saharan Africa has only begun to emerge. There are few studies conducted in the recent past (i.e. in the past one to two decades) in the region which have used national-level population-based survey or census data to measure trends in internal migration by sex. Such studies have suggested that in South Africa, women's participation in internal migration has been increasing, and may have become on par with men's levels of internal migration. Data for specific intra-national populations from demographic surveillance sites in South Africa, as well as population-based survey data from other localities, have even suggested that women's levels of mobility may exceed those of men, particularly among younger adults. However, posing the questions of whether women's migration is increasing, or whether women are more likely to migrate than men, appears tantamount to posing the question, 'how should migration be defined and measured?'

Issues in the measurement of female migration and mobility. The preliminary

and final reports of the UN's Expert Group (Bilsborrow 1992; Hugo 1993) outlined many of the essential problems and research gaps that remain pertinent to the measurement of the scope and extent of women's involvement in internal migration. The group decried a paucity of national data to adequately measure patterns and trends of female migration, noting that national censuses typically under-represent women's migration, as well as their labor force participation, for a variety of reasons. "The practices of gathering migration information only about household heads or of identifying migrants only in terms of fairly large administrative units (e.g. states) were noted as important sources of bias, since women were less likely than men to be perceived as household heads by interviewers or to move over long distances" (Bilsborrow 1992)(p.139). Compounding these issues, the panel noted that women were also more likely than men to live in temporary housing, and to be involved in employment which is informal or illegal, both of which contribute to their under-representation in national censuses and population-based surveys (Bilsborrow 1992; Hugo 1993).

It must be said that data on migration overall, much less sex-specific data, can be difficult to obtain by conventional census and survey methods, as study populations are usually linked through permanent residence to a defined area (i.e. a country, state, municipal, village or surveillance area). Individuals who live outside this area are usually not eligible for selection, or if they migrate during longitudinal studies, are considered to be '*lost to follow-up*' unless efforts are made to track them (Hosegood and Timaeus 2005). These data limitations have certainly persisted, and migration is often defined as "absence" from home in household surveys, or as a "permanent change in residence" in census data, precluding an ability to capture the full extent of women's migration. In

contrast, data emerging from demographic surveillance sites have increasingly captured shorter-term "movement" to and from temporary residences in multiple destinations, a pattern more followed by women (Ibid.; (Collinson, Tollman et al. 2003; Camlin, Hosegood et al. 2007). Some such sites permit a more nuanced, detailed distinction between *membership* and *residence* in a household, which may allow for measures of residence and mobility that are closer to the lived experience of people in developing country contexts such as South Africa's. There, households are extraordinarily geographic stretched, as members are sent to seek employment, whether it be in formal or informal sectors, (as well as for other purposes such as schooling), yet retain a meaningful connection to their rural household of origin. Data from a demographic surveillance site in KwaZulu-Natal show that migrants constituted a full 35% of the total household population, and 41% of adult and 29% of child members were not co-resident with their rural household (Hosegood and Timaeus 2005). A limitation of data from demographic surveillance sites, of course, is that they are useful for comparison with similar localities, but are not representative of larger geographic units or areas.

The UN group noted that research on migration continued to tend to view females only as "'associational migrants' (i.e. moving as passive companions of other family members), while assuming that males were generally autonomous migrants or active decision-makers." (Bilsborrow 1992, p. 140) This assumption was found to be unwarranted, as women have been migrating not only for marriage, but were seen to be increasingly involved in labor migration. Citing Waring (1988) and others, Bilsborrow (Ibid.) argued that studies of migration in the field of economics have particularly contributed to the invisibility of women, in part by ignoring, in macro- and micro-

economic accounting, the unpaid labor of women in households; further, that women would choose to migrate to improve the conditions under which they carry out these unpaid activities has rarely been considered in the literature. Furthermore, only recently had the economic aspects of marriage in relation to marriage begun to be explored (Ibid.). Yet, surveys that focused only on economically active women or women that migrate for economic reasons were "almost certain to misrepresent female migration" (Bilsborrow and Secretariat 1993)(p. 2). The UN reports concluded that although more women were migrating for ostensibly economic reasons, the majority of women migrate for reasons that researchers have categorized as "associational", or non-economic.

Casale and Posel's exploration of trends in women's participation in the South African labor force (Casale and Posel 2002) also critiqued the ways in which women's economic activities had been classified in the various censuses, particularly with respect to subsistence farming. In the 1951 and 1960 censuses, men of working age in the former homelands were treated as employed in subsistence farming if no other occupation was specified, while women in the same position were classified as 'housewives' and not economically active. In 1970, the wives of household heads were classified as 'housewives' but other females of working age were classified as employed in subsistence farming. After 1970, women in subsistence agriculture were again treated as not economically active. The October Household Surveys were introduced in 1993 in South Africa in order to provide a more reliable and detailed picture of national labor market trends. Yet there were problems with the use of these surveys for the purpose of analyzing trends, as both sampling methodologies and questionnaires were changed over the rounds of the surveys. Further, they argued that for methodological reasons, informal

sector employment may have been under-estimated in recent surveys, with the implication that "female labour force participation and women's share of employment (in informal sector employment in particular) are under-estimated." (Ibid., p. 170) These problems are complicated by an overall decline in the coverage of labour migrants in household surveys in South Africa in recent years (Posel and Casale 2003).

The general conclusions within methodological critiques of the literature on migration are that existing data sources have tended to be biased towards measures of migration that better capture men's patterns of movement, and thus that only a part of women's mobility has been reflected in most national-level census and survey data estimates of female migration. Data from smaller-scale population-based surveys and demographic surveillance sites have tended to employ more detailed measures of mobility, and thus derive higher estimates of female participation in migration flows. These data sources also reveal distinct sex differences in types and patterns of migration.

How do men's and women's patterns of migration differ? Notwithstanding these measurement issues – nor the limiting of its range of exploration of census and survey data to the 1960s-70s era – the UN group concluded that existing data sources suggested that not only the levels of female internal migration, but also the complexity and types of female migration also appeared to have been growing. The group put forward several claims on the basis of its analyses and the small body of extant research: that women's migration patterns differed from men's in several respects: compared to their male counterparts, female migrants made shorter-distance, more often temporary moves, and were less likely to participate in formal employment. The panel anticipated that the causes and consequences of migration would differ by sex, as existing gender

power asymmetries create and constrain opportunities for migration for men and women; and it speculated that not only household factors, but also social networks and broader socio-cultural factors, may play a major role in stimulating and constraining female migration (Bilsborrow 1992; Hugo 1993).

At roughly the same time of the publication of the UN expert group's report, Chant and Radcliffe (Chant and Radcliffe 1992) similarly proposed a framework for the study of female migration in developing countries. They identified eight "characteristics of the gendering of migration" that are found in most developing country contexts:

- Men are more mobile than men, and it is women who are more often "left behind";
- Women left behind are often disadvantaged by male out-migration;
- Men move further and to a wider range of destinations;
- Men's migration is undertaken more independently than that by women;
- Men migrate "in ways that are linked much more directly with access to employment";
- Migrant women "have fewer employment opportunities than migrant men in destination labour markets";
- Men migrate across a wide range of ages, whereas female migrants tend to be young; and
- In terms of both social and economic links, women "maintain more enduring ties between areas of origin and destination." (Ibid.)

Are women still being 'left behind', and does this disadvantage them? The earlier literature tended to support Chant and Radcliffe's first precept: a substantial body of historical, anthropological and rural sociological literature has documented women's experiences of being "left behind" in southern Africa. The evidence for the second precept is more mixed, depending upon how female 'disadvantage' is defined. Male migration was central to household livelihood strategies, and a large body of literature documents the economic advantages to rural households of sending a migrant. Nearly every study of the impacts of migration focus on its key role in household socio-

economic mobility and development (Todaro 1976; Sabor 1979; Stark 1991; Massey, Arango et al. 1998; van der Berg, Burger et al. 2002; Kothari 2003; Zuberi and Sibanda 2004; Massey 2006; Tienda, Findley et al. 2006; Halliday 2007). Yet, another body of literature documents changes in rural societies that were wrought by the system of male labor migration, broadly with respect to the effects of male migration on marriage, households and family structure or 'family life'. Murray focused on the negative consequences of the male migrant labor system, for marriage systems (Murray 1976) and family structure (Murray 1980) in Lesotho, noting "the irony that the migrant labor system, which is the means by which Basotho find the cash to establish legitimate marital relationships, is itself the largest threat to marital stability by enforcing the separation of man and wife for repetitive periods of indefinite duration"(1976, p. 99). At least since the 1970s, bridewealth payments were made predominantly in cash earned through migrant labor, rather than in cattle as had been the previous practice, and, as agricultural productivity declined as a livelihood strategy in rural Lesotho, "bridewealth and subsistence needs [began to] compete directly as a problem in the allocation of resources." (Murray 1976), p. 114). Anticipating Hunter's work on changing forms of masculinity and the political-economy of sexuality in KwaZulu-Natal (Hunter 2007), he documented the increasing cost of bridewealth and other economic pressures on families, tying conjugal instability, illegitimacy, desertion and the break-up of families to the male migrant labor system (Murray 1980). His later work on the predicament of ex-farmworkers and their families in the South African Free State (Murray 1995) provided further documentation of the mining industry decline and rising male unemployment of the 1980s, and the effects of these on family settlement patterns.

Spiegel's explorations of sexual behavior in Lesotho (Spiegel 1991) further advanced the argument that the male migrant labor system resulted in a fragmentation of marriage and the widespread acceptance of extra-marital partnerships; his work highlights the ways in which discourses of 'tradition' are used to justify non-normative contemporary practices, problematizing the ways in which contemporary understandings of polygyny support multiple partnerships. Smith's research on marriage and extramarital sex in Nigeria continued this theme, tracing male mobility to the extramarital relations of men (Smith 2007), and more broadly to a perpetuation of gender inequality and conflict. Lovett's work on marriage in Tanzania (Lovett 1996) is exemplary of a line of research connecting male migration- both their absence from rural households, and their decreasing ability to marry- to the greater independence of women (as well as of younger men), exacerbating male gender anxiety and undermining traditional power structures in which male elders held substantial social control.

In sum, as described in the previous section of this chapter, recent research challenges the notion that women are broadly more likely to be "left behind", and less likely than men to migrate; and a small, fragmented, but growing body of literature supports the notion that this is a new and growing phenomenon. Evidence for the proposition that male migration disadvantages women is equivocal; accounts of a wide range of 'effects' of male migration on women are found in the literature.

How do men's and women's migration destinations, frequency of movements, and durations differ? The evidence is strong, however, that men do move further, for longer periods, and to a wider range of destinations than women; this precept of the earlier migration literature (and of Chant and Radcliffe's framework) has tended to be

borne out by more recent research. In South Africa, the movement of men for most of the year into cities for work in mines and factories (the paradigmatic circular labor migration model), has tended to be captured well using traditional approaches to measuring migration in national surveys and censuses. Data from demographic surveillance areas in South Africa have tended to better document an increased migration to semi-urban towns, to the rural perimeters of metropolitan areas, and between rural villages. A higher proportion of female than male migrants travel to these areas, which are closer to home, while males have tended to continue to migrate further to the cities and mining areas of Gauteng (Lurie, Harrison et al. 1997; Collinson, Tollman et al. 2003; Posel 2004; Hill and Hosegood 2005; Camlin, Hosegood et al. 2007). Dodson's Southern African Migration Project data, in turn, have shown that of the international migrants to South Africa from surrounding countries, males have continued to favor the mining areas, along the corridors that members of their social networks have previously traveled, and where work at least once *was* found. In contrast, women have favored smaller trading towns and cities as migration destinations (Dodson 2000). Further, while national surveys and census have tended to capture well the permanent migration of individuals from rural to urban areas, these data sources are inherently limited in their ability to permit, as do the demographic surveillance sites, the description of women's more frequent movements to several homesteads, in a pattern better described as "polygonal" than circular (Hunter 2004).

Ethnographic research from South Africa generally provides support for the observations derived from demographic surveillance. As Bozzoli noted, in her social history of the "Women of Phokeng" (Bozzoli 1991), "Migration did not involve spending

the long lonely periods away from home which the more distant migrant would experience. The surrounding towns and cities were relatively well known and understood, in ways that reflected the mental maps Bafokeng women held of their own rural universe." (p. 95). Similarly, in KwaZulu-Natal, Hunter observed:

> Probably the majority of rural women tend to pivot multiple movements around their rural home, a fairly flexible arrangement allowing for women's frequent movement, the cheap reproduction of children, the transfer of resources through sexual liaisons, and the redistribution of state benefits, especially pensions, usually through the presence of a rural *gogo* (granny)."(Hunter 2004)(p.3)

Yet, complicating this clear picture of a sex dichotomy in migration destination types is the shifting definition of 'urban area' in a post-apartheid South Africa undergoing rapid transformation. Anderson estimates that net rural-to-urban migration rates increased from 2% in 1980-84 to 15.4% in 1995-99, per 1,000 population in South Africa (Anderson 2006), yet notes that this designation of 'urban' is difficult: no longer subject to brutal spatial interventions such as "forced removals" by the apartheid state, "informal settlement areas"[v] have dramatically grown in size in South Africa over the past two decades, in a process she refers to as "displaced urbanization" (Ibid.) These areas typically surround municipal and industrial areas; they decreasingly provide low-wage employment, yet continue to attract work-seekers, as places were work was once found. They are also typical settings for the informal sector employment (such as small-scale trade, beer-brewing, sewing and other activities) in which women predominate. Hunter notes that since the early 20th century, informal settlements have been know to be places of poverty and transactional sex, but also as places that attracted female migrants, as they were known to allow women "a certain independence" (Hunter 2006)(p. 17).

How urban areas are designated and defined, and whether these areas of 'displaced urbanization' are defined as urban, has implications for the measurement of sex differences in migration flows and destinations. Thus, while males are said to predominate in the rural-to-urban, paradigmatic internal migration flow, this conclusion may not be supported as designations of 'urban' expand to include the informal settlements areas and townships surrounding large cities.

Are men more free than women to independently decide to migrate? The proposition that men's migration is undertaken more independently than that by women (Chant and Radcliffe 1992; Bilsborrow and Secretariat 1993; Hugo 1993) also finds some support in the recent research. The Southern African Migration Project survey data indicated that in 1997, 65% of female migrants and only 38% of male migrants said that the final decision to for them to migrate was taken by someone other than themselves (Dodson 2000). Among a set of questions regarding their future intentions to migrate, 78% of males and only 63% of females "would be able to go if they wanted to" (Ibid.).

These data are among the few to directly measure gender-based constraints in the decision to migrate. Yet other sources provide peripheral evidence to support the notion that household decision-making related to migration – who decides, and who is sent – cannot be fully understood without an attention to larger gendered power inequalities in households and communities that influence migration decision-making. Anthropological research in Africa amply documented the power that chiefs, fathers and husbands held with respect to restricting women's mobility and reinforcing women's roles in rural production, and women's traditional roles in child care and farming reduced the likelihood of migration (as did marriage) (Meillassoux 1960). In microeconomic theory,

the unified household theory, which posits the household as a ‘harmonious unit in which all members were united in maximizing resources and resisting threats to its integrity’ (Walker, 1990, p. 177, in Posel 2006), predicts greater levels of male migration from rural households where men have a comparative advantage over women in wage employment relative to rural production, and also assumes altruism in the remittance behavior of male migrants. Posel and Casale have argued that women ‘remaining behind’ in the rural production role may have less to do with the maximization of household utility, and more to do with gendered divisions of labor that are upheld by the 'internal structures of control' in rural communities, including social pressure, gender ideology and women's economic dependence (Posel and Casale 2003).

In support of this argument, Posel has noted that in South Africa in the 1990s, households headed by an employed man or a male pensioner were less likely to send a female migrant (Posel 2006), and those with a female pensioner, were more likely to send a female migrant (Posel and Casale 2003; Posel 2004). She posits that the 'unified household' theory is also a model in which men have control over household decision-making, but use it to choose themselves as migrants to maximize their own earnings. She ties the greater levels of involvement of women in migration to their greater freedom to independently choose to migrate, due to an increase in female-headed households and a decline in marriage: the percentage of women living with at least one man of working age fell from 83% in 1995 to 77% in 1999 (Casale and Posel 2002); concomitantly, the percentage of household heads that were female increased: in 1999, 37% of all African households were headed by females (ibid.) Several other researchers have also commented upon gender power relations within households and women’s responsibility

as caregivers (of both children and elders) that act to constrain female migration, and upon the greater freedom unmarried women have to migrate, relative to their unmarried counterparts (Chant and Radcliffe 1992; Todes 1998); Jones, 1994)

Somewhat in contrast to this literature, Lesclingand's (Lesclingand 2004) research on the migration of young women in Mali found that in this region, women's migration is increasingly seen as an individual strategy, not only for the purpose of earning an income but for personal independence, valorization and social recognition. In contrast, migrant remittances from men are still part of the livelihood strategy of rural households (Ibid.). She documents a convergence of women's rates of migration from rural areas with those of men: while men migrate mainly to other rural areas for agricultural work as they have done for decades, women increasingly are moving to pursue opportunities for domestic work in the cities and towns.

Whether or not women independently take the decision to migrate depends, of course, also upon the purposes of their migration, particularly whether for the purpose of marriage; and marriage decisions in the region, at least historically, involve not only the couple but their families. A characteristic of female migration in sub-Saharan Africa, long considered to distinguish it from male migration, related to African patrilocal marriage system in which upon payment of bridewealth, women moved to their husband's households. There are variations in the system, but the anthropological and historical accounts generally describe a social pattern in which the children of the marital union remained in the male lineage, yet the circulation of community wealth in cattle and land was ensured through marriage within the descent or lineage group (Fortes 1953; Goody 1973; Preston-Whyte and Sibisi 1975; Fortes 1978). While the earlier literature

on migration in sub-Saharan Africa largely assumed migrants were male, where female migration has received greater attention, the scholarship has often pointed to their mobility for the purpose of joining a husband as the dominant motivation (Sabor 1979; Wilkinson 1983; Hugo 1993). Yet, a central critique of the migration literature offered by the UN's expert group is that women's migration for the purposes of marriage has not been adequately measured. To further elaborate on this question, I next review the literature that has aimed to elucidate sex differences in the purposes of migration.

To what extent is women's migration in sub-Saharan Africa still related to marriage? Several recent studies provide support for the assertion that marriage remains a key purpose for a significant proportion of female migration: a longitudinal population-based study in Tanzania found that 25% of female migrants had left their households of origin for the purpose of marriage (Boerma, Urassa et al. 2002). In rural Zimbabwe, women were more likely than men to migrate for marriage, and this varied by migration destination: 63.5% of female migrants to rural areas and 28.3% of those to urban areas moved for the purpose of marriage (Coffee, Garnett et al. 2005). A study from a demographic surveillance site in Limpopo Province in South Africa found that women's migration was associated with their changes in marital status (Collinson, Tollman et al. 2003). Yet in several of these studies (in Tanzania (Sabor 1979), Lesotho (Wilkinson 1983), and South Africa (Collinson, Tollman et al. 2006), as in other developing countries (Hugo 1993), an apparent increase in the mobility of women was accounted for due to an increase in the number of independent, single women seeking economic opportunities.

Furthermore, migration for marriage may be losing salience, as marriage rates are

on the decline across the region. Bongaarts (Bongaarts 2006) and Harwood-Lejeune (Harwood-Lejeune 2000), both using Demographic and Health Survey data from sub-Saharan African countries, have documenting declining marriage rates and a rising age at first marriage across the region, linking these factors to fertility decline (Harwood-Lejeune 2000) and rising HIV prevalence (due to a lengthened period of premarital sex during which partner changes are common, facilitating the spread of HIV in populations) (Bongaarts 2006). In South Africa, until recently, reports of declines in marriage were largely anecdotal, as reliable nationally-representative population-based estimates were lacking (Budlender, Chobokoane et al. 2005). Apartheid government concerns about security and secrecy meant that little of the demographic research conducted between 1960 and 1990 by the government was published, while the quality of census data collected on the African population was generally poor (Camlin, Garenne and Moultrie, 2004); as late as 1991, the South African census excluded the former homeland areas (Ziehl, 2001). Furthermore, policies implemented by successive apartheid governments led to the country's exclusion from international data series such as the World Fertility Surveys. South Africa's first Demographic and Health Survey (SADHS) was conducted in 1998. The existing data are also subject to unique problems, including a wide diversity of marriage forms in South Africa; language distinctions; and inconsistency across data collection instruments and methodologies. Perhaps as a result, the literature on marriage in South Africa has been rather small, and highly focused on methodological issues; data on marriage trends are quite limited.[vi] The main data available for analyses of these trends are national vital statistics, which are subject to a range of weaknesses, census data, the October Household Surveys and the SADHS. Moreover, numerous sources cite the

difficulties of measuring marital status across various African societies in which marriage has been viewed more as a cumulative process than a discrete category (Ibid.; (Murray 1976).

These weaknesses notwithstanding, Posel's analysis of October Survey data showed that the national percentage of black women currently married declined from 34.6 percent in 1993 to 30.1 percent in 1999. Udjo's comparison of 1970 and 1996 census data provided no national aggregated marital status estimates, but noted that in KwaZulu-Natal, the percentages of those over age 50 reporting they had never been married or were living in a non-marital co-habiting relationship had risen from 14 to 27 percent of men, and from 5 to 18 percent of women (Udjo 2001). A very recent analysis of demographic surveillance data from a predominantly rural area of the province showed a continuous decline in marriage, and increase in the proportion never married, between 2000 and 2006; by 2006 a full 69 percent of women had never been married (Hosegood, McGrath et al. 2008).

At the same time as marriage has declined, women have joined the labor market in increasing numbers. The sex composition of the labor force dramatically shifted as unemployment rose in South Africa over the 1990s: for males, the participation rate dropped from 97% in 1960 to 65% in 1996; for females it rose in the same period from 30 to 49% (Feinstein 2005). Yet, there is little evidence that the feminization of the labor force is associated with women's increased mobility in the market (Casale and Posel 2002). The biggest changes seen for women over the 1990s were in increased unemployment and in self-employment in the informal sector, marked by low-paying survivalist activities (ibid.).

Several researchers have speculated that women's increased labor force participation in the 1990s could be attributed to economic pressures resulting from declining male participation (Casale and Posel 2002; Hunter 2006). Specifically, Casale and Posel assert that the trend was due to women's increasing levels of education, declining rates of marriage, and the fall in the proportion of women living with at least one man of working age, the latter two changes being "suggestive of a fall in women's traditional forms of income support within the household" (Casale and Posel 2002)p.191). Similarly, Hunter has argued that declining marriage rates in South Africa (as well as a broader transformations in 'masculinities') are a consequence of male unemployment in South Africa; he has posited that women's increasing mobility is linked to the ever-decreasing likelihood of receiving the income support of a husband (Hunter 2006).

While a direct link between declining marriage and increasing female migration cannot be proved, other sources certainly belie the conception that female migration in sub-Saharan Africa is primarily "associative". Dodson and Crush's (Dodson and Crush 2004) report on the 2002 South African immigration policy provides a useful overview of the ways in which the purposes of international migration in southern Africa are differentiated by sex. Their analyses suggested that while men's migration is still undertaken largely for purposes of formal sector employment, women's migration is characteristically multi-purpose, "reflecting the complex combination of productive and reproductive, paid and unpaid tasks that women typically perform" (Dodson and Crush 2004)(pp. 101). They argue, "Even when it is undertaken primarily for purposes related to employment, most women's cross-border migration in Southern Africa is quite unlike the structurally and geographically rigid system of male mine labour, being far more

varied in its geography and temporality and tenuous in its legality and security."(Ibid., pp.101-102).

Recent studies from West Africa confirm the finding that women's patterns of migration in the region appear to be more complex than men's, in both pattern and in the diversity of motivations: Le Jeune's (Le Jeune, Piche et al. 2004) analyses of event history data drawn from the 'Migration Dynamics, Urban Integration & Environment in Burkina Faso National Survey' showed that, no longer remaining at home to sustain domestic production, women are increasingly involved in labor migration. Female migrant patterns in Burkina Faso are growing more complex: where previously female migration largely comprised the pattern of movement to join a husband's household, "women are emigrating more out of rural areas and experiencing increased multiple move trajectories. [Their] motives are also less-family driven and more related to education and labor market considerations." (Ibid., p. 170 This research finds a parallel in the work of Lesclingand on the migration of young women in Mali, mentioned previously. Far from migration for the purposes of marriage, young women are moving to pursue opportunities for domestic work in the cities and towns (Lesclingand 2004). Like their male counterparts, young women increasingly view migration for work (as distinct from migrating to join a husband's household, as in the patrilocal marriage tradition) as tantamount to entering into adult life (Lesclingand 2004). Indeed, Lesclingand argues that in recent times, this migration of young women is an expression of gender transformation: an escape from traditional social controls, towards a vision of more egalitarian relations between men and women.[vii] Consumer goods such as clothing, radios, cell phones or cooking utensils—all of which would in previous times been

passed to young women upon marriage and joining a husband's household— are for the young female migrant acquisitions which differentiate her from the traditional role she left behind, symbolizing her higher status, an expanded sphere or "life space", and agency to constitute her own place in the world (Ibid.).

Similarly, Assogba and Fréchette (1997) have explored the extent to which young women's involvement in migration today is an expression of their agency, and an assertion of independence: they argue that for young Ghanaian women, the decision to migrate is not merely a household decision, but emerges from a dynamic in which a woman's individual aspirations interact with the needs and demands of her larger social milieu: her "needs, aspirations, vulnerabilities, life dreams, and interactions with family and community, interact together to establish the choice, to migrate or not."[viii] One finds little research from Southern Africa on the aspirational aspects of migration for women, although anecdotal reports suggest that young people, and young women especially, migrate in order "to experience life with more autonomy than is possible in the conservative patriarchy of the rural areas" (Kahn, Collinson et al. 2003)(p.14).

Summary of the literature. In summary, while female migration in southern Africa is often assumed to be 'associational', that is, to involve a move for marriage or to join a partner or family, evidence is accumulating that a growing proportion of female migration is undertaken for the purposes of generating income, or searching for work, or to attain a higher social status and standard of living. The bodies of literature reviewed for this chapter provide support for both views underlying the essential "structure versus agency" argument inherent to an exploration of the causes of the feminization of migration in sub-Saharan Africa: women's migration may be viewed as an expression of

their agency and capacity, and an assertion of desire for status as 'modern women', per the accounts of Lesclingand (2004) and Assogba and Fréchette (1997), but also as a reaction to the economic and social defeats women are experiencing, through which their choices become narrower, per the numerous accounts of women's declining income support from men due to male unemployment and low marriage rates (Preston-Whyte 1993; Casale and Posel 2002; Preston-Whyte 2003; Hunter 2006; Posel 2006; Hosegood, McGrath et al. 2008).

Although internal migration is conventionally assumed to consist of a rural-to-urban migration flow, patterns of migration in sub-Saharan, particularly among women, appear more complex, matching the general conclusions the UN Expert Group reached on the basis of its analyses of data from other regions. Traditional approaches to measuring migration, using survey and census methods, have tended to capture well the permanent migration of individuals from rural to urban areas, and in the southern African context, the movement of men for most of the year into cities for work in mines and factories (the paradigmatic circular labor migration model). However, these approaches fail to describe women's more frequent movements to several homesteads in rural and nearby peri-urban areas and towns (in a pattern better described as "polygonal" than circular.) Still, the empirical data in support of these conclusions remain limited. Studies using existing national survey datasets and censuses have provided few data on sex differences in patterns of mobility in South Africa, and the number of studies using from demographic surveillance sites is quite small. Ethnographic data have elucidated several of the questions regarding sex differences in mobility patterns, but population-based studies are needed to provide a generalizable view of the features of female migration. In

sum, the types and patterns of women's and men's mobility in South Africa today remain under-researched.

An analysis of sex differences in patterns and of migration in KwaZulu-Natal, South Africa. This section begins to provide an empirical response to two of the research questions that I have pursued in my review of the literature on migration: What is known about the more recent levels of participation of women in internal migration in South Africa? How do the features of female migration in South Africa differ from those of male migration? To address these questions, I present the findings of an analysis of data from a demographic surveillance system (DSS) site located in Umkanyakude District, a predominantly rural area of KwaZulu-Natal (KZN) about two hours north of the provincial capital of Durban. The research institution, the Africa Centre for Health and Population Studies, has since 2000 collected detailed demographic, social and behavioral data in a population of over 80,000 individuals (including approximately 50,000 adults). In 2003, the Africa Center launched an HIV surveillance project in the population, enabling the annual collection of HIV serological data for all participating adults, and the linking of these data with other individual level data. In this study, I hypothesize that the magnitude of women's involvement in migration processes has not been fully measured, and that conventional approaches to the measurement of migration have been biased towards male patterns of movement. I hypothesize that the use of more innovative and detailed measures will better capture genuine sex differences in migration and mobility, and more accurately capture the extent of women's participation in migration, in a population in KZN, South Africa.

Data source: Africa Centre Demographic Information System (ACDIS). ACDIS

was designed to closely reflect the complexity of the social organization of rural communities of KZN as well as the high mobility of the population. ACDIS covers an area of 435 km^2 and collects data on bounded structures, households and individuals within this area. Bounded structures are the structures within the Demographic Surveillance Area (DSA) that are intended to have either a residential purpose (known as homesteads) or provide a service (e.g. schools, clinics, churches). All structures are mapped with Geographical Positioning System technology. The households that are resident at these bounded structures are registered, and individuals are then linked to all the households of which they are a member.

An important design element of ACDIS, which distinguishes it from most other censuses and surveys, is that it uses both spatial and social definitions of household membership: membership, not residency, is the main eligibility criterion for individuals to be included in the population. The Africa Centre distinguishes between household membership and residence because the population is highly mobile, and households are often geographically "stretched". Household members self-report their place of residence. Typically this is the place where they keep their daily belongings and spend most nights. An individual can only be recorded as resident at one residence at any point in time. At each fieldworker visit, any change in residency (i.e. in- out- or internal- migration) is recorded, together with information about the origin or destination and the date of the move. To be included in the DSA, the sole criterion is that an individual must be considered, (by other members of the household, usually the household head), to be a member of a household within the DSA. At each visit to a household, the household membership roster is reviewed and updated on the basis of any changes in membership

(including additions and losses to the household membership roster due to births, deaths, in-migrations, or out-migrations.)

Population. Previous analyses of ACDIS data indicate that there were 85,529 individuals in the population as of Jan. 1, 2001. Some 28% of adults aged 15 to 49 were non-resident household members on that date. Some 38% of the population was under 15 years of age, and 53% were females. There were 11,033 households resident in the DSA on the 1st of January 2001. Some 5% of households had either in-migrated or formed during 2000; and 1,243 registered households had externally out-migrated or ended before Jan. 1, 2001 (PSG, 2004).

Setting. The surveillance area encompasses both land under tribal authority that was designated as a Zulu 'homeland' under former apartheid policy, and a township under municipal authority. Infrastructure and living conditions are poor: in 2001, 50% of households had no electricity, and only 13% had access to piped water. Although the area is primarily rural, there is little subsistence agriculture and most households rely on pension and wage income (Case and Ardington 2004). Mortality in the study area rose sharply in the late 1990s, largely as a result of HIV/AIDS: by 2000, the probability of dying between the ages of 15 and 60 was 58% for women and 75% for men. AIDS with and without tuberculosis was the leading cause of death, accounting for 48% of death in adulthood (Hosegood, Vanneste et al. 2004).

The first sero-prevalence study to emerge from ACDIS (Welz, Hosegood et al. 2007) showed that overall, 27% of female and 13.5% of male residents were HIV infected. HIV prevalence peaked at 51% among resident women aged 25-29 years and 44% among resident men aged 30-34 years, with the highest infection rates of 57.5%

among 26-year-old women. The female to male infection ratio among residents aged 15-19 years was 13.0. Increased mobility was associated both with an increased risk of HIV infection among residents, and also with non-participation in HIV surveillance. HIV prevalence was higher in non-resident compared to resident household members, at 34% among men aged 15-54 years and 41% among women aged 15-49 years (Ibid.).

Methods. *Dataset development*. ACDIS data is stored in a relational database of some 200 linked tables which are periodically updated. Data are stored primarily as events or episodes, in keeping with the longitudinal nature of the demographic surveillance process. For this analysis, data were selected, compressed and re-shaped as necessary to produce a 'flat' dataset with individuals as the unit of analyses (and no observations repeated across rows) and with temporal consistency in the measures used. This analysis is carried out on the population cohort of 47,669 adult aged 18 and older who were members of households on 01 January 2001.

For simplicity of design and clarity of presentation, this analysis focuses principally on the 45,717 adults who were members of only one household on that date, and excludes the households of those who had multiple household members (4% of individuals had more than one household membership on that date)[ix]. These households are described and compared to singular households in Appendix A (with a notation.)

Information on individuals' periods of residency in households in the DSA over the period 01 January 2001 through 01 January 2007 were used to describe their migration behaviors over that period. In this chapter I refer to external in-migrations (moves into the DSA) as in-migrations, moves from one residence to another within the DSA are referred to as internal migrations, and external out-migrations are referred to as

out-migrations (moves out of the DSA). In some instances, only migrations within a two-year period are presented. A certain proportion of the population of household members on 01 January 2001 had no residency episodes at all over the period; that is, they remained non-resident throughout the six-year period. Data were constructed in such a way that non-resident household members remained in the dataset.

Further analyses of the socio-demographic characteristics of migrants and non-migrants (using the various definitions of migration) are carried out on the subset of the population of 39,913 adults aged 18 and older who participated in the first round of a Household Socio-Economic Survey (HSE) beginning in 2001; the data were collected for each individual in the household between February 1 and September 20, 2001. For non-resident adult members of household, information on their individual characteristics (e.g. education level, employment status) was provided by a proxy informant in the household. (For some resident members of the household who happened to not be present in the household on the visit date, for instance those who were in school or working during the day-time visit, the information was also provided by a proxy informant in the household.)

There were 5,804 adults who did *not* participate in the survey, and, although data are limited, other ACDIS sources provided some information about the characteristics of the non-participating population. Statistical comparisons of the populations that did and did not participate in the HSE revealed that there were systematic differences between them: those who participated in the HSE were more likely to be female, and to be resident members of households.

Non-participants tended to be younger, and a smaller percentage was currently married. Despite the younger age distribution of the non-HSE participating population, a larger

proportion died in the period between 01 January 2001 and 01 January 2007. An examination of the migration behaviors of the two populations showed that, overall, non-HSE participants were somewhat more mobile than those who participated in the questionnaire. Systematic differences in household structure and composition were also detected.

These findings raise the issue of selection bias in the estimates derived from the HSE surveys. As Berk (1983) noted, the potential for sample selection bias exists whenever potential observations from a population of interest are excluded from the sample on some systematic basis. The principal problem with potential sample selection bias is that it threatens the external validity of a study.[x] Berk emphasizes that sample selection bias also jeopardizes the internal validity of a study (where the exogenous variable and the error term are confounded, causal effects attributed to the exogenous variable are really a result of random disturbance.) In effect, the 'selection' process introduces a need for a new variable, which would capture the deviations of the expected values from the regression line resulting from bias. For this purpose, I have drawn upon a weighting method that has emerged in the economics literature, broadly under the rubric of "Propensity Score Methods". The purpose of generating a propensity score is to determine the propensity of participating in HSE for all of the members of the population, and to use this score for applying a non-response adjustment weight to the analyses. As described by Little and Rubin (2002), the propensity score specification can be estimated using a logit model, i.e.:

$$\ln[\Pr(M = 1) / (1 - \Pr(M = 1))] = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots \beta_i X_i$$

Where X_i … represents the known covariates of participation in the HSE survey. The

predicted probabilities from this model are the 'propensity scores'. I then weight the respondents by dividing the mean HSE survey participation rate by the predictions of the regression, i.e. weight=r(mean participated) / Pr(M = 1). This propensity score weight was then used as a frequency weight when generating percentages of the population by certain characteristics. In Tables 2.1A through 2.2B, I present analyses using the weighted HSE population in order to describe socio-demographic and economic characteristics of individuals and households. In Tables 2.3 and 2.4 (and in all figures), I present a description of the sex differences in migration patterns using the total adult population of singular household members, and do not restrict the data to those with an HSE. HSE data are not required to produce the estimates displayed and therefore the data are not weighted with the propensity score weight for those tables and the figures.

At each visit to a household, ACDIS gathers information about who in the household is considered to be a member, their current marital status and partnership pattern, and their pattern of recent presence in the home. For this analysis, the most recent information collected prior to (or at the same time as) the collection of socio-economic data was used for each individual who participated in the HSE. Where HSE data were missing, the household membership information collected at the earliest visit after 01 January 2001 was used (in order to render the time period for the HSE and non-HSE populations as equivalent as possible, given that most of the HSE 1 data were collected in the first half of 2001). This dataset was also constructed in such a way that it captured only the migration events which occurred *after* the collection of the first round of HSE data, or after 01 January 2001, where HSE data are missing, and up to December 31, 2006. Some variables capture only the migration events that occurred within two

years of the HSE visit date, or within two years of 01 Jan. 2001 (i.e. between that date and 01 Jan. 2003), where the HSE data were missing.

Variables. A key purpose of this analysis is to explore how the sex composition of 'migrants' in the ACDIS population shifts depending upon how mobility and migration are defined. Therefore, a number of measures are used, beginning with the 'residency status' defined in ACDIS. The ACDIS definition of 'non-resident' household member is akin to the definition of 'migrant' that has been used in many studies, in that the individual is considered to be a member of the household, but is living elsewhere. In many cases, a non-resident household member is akin to – and is described in some studies using these data – the 'labor migrant'. Most non-resident members can be assumed indeed to be non-resident for the purposes of employment or the search for employment. But non-resident household members also include those who are away from the home in the DSA for purposes of schooling or other reasons. Non-resident household members can be considered to have changed their residence at some point in the past; they maintain at least two places of residence, and move between them. Yet, they differ from individuals who move permanently out of a household (externally out-migrate) and end their membership in that household. Many out-migrants permanently relocate and end their membership in households in the DSA, but a proportion of out-migrants are residents who become 'non-resident household members', retaining a significant tie to the DSA.

In Tables 2.1A and 2.1B, I compare the individual and household characteristics of adults who were resident and who were non-resident members of one household on 01 January 2001. In addition to this residency *status* measure, I use estimates of three types

of migration that occurred within two years of the HSE visit (or 01 January 2001, for non-participants in the survey): external in-migration to the DSA (moving into the area to join an existing household or form a new one), internal migration to another residence within the DSA, or external out-migration (a move outside of the area). I use dichotomous measures of these types of migration (i.e. whether or not the individual experienced one or more of the migrations in the period) and continuous measures of the number of migration events over the period by type. In this analysis I have focused primarily on the *individual* migration events which comprise the majority of all migrations, but I also show information on sex differences in the two-year prevalence of the smaller number of migrations involving households as a unit, shown in Table 2.4 and Figure 2.4. Tables 2.2A-2.2C show the population characteristics associated with individual internal, in- and out-migration.

In addition, I examine two measures of short-term mobility: a dichotomous measure of present versus not present at household on the night prior to visit; and a categorical measure with four levels: In the household every night, present most nights, present approximately half, and present few or no nights in the previous six months. The latter two measures refer to the time period preceding the HSE visit, or the earliest data collection visit to the individual following 01 January 2001.

On the basis of prior research, I examine the following sets of characteristics likely to be associated with migration in a primarily rural area of southern Africa: first, I examine individual characteristics such as sex, age, employment status, education level, marital/partnership status, and parenting status, i.e. whether a father or mother, and whether linked as a parent to the children in the household in which one is a member. In

the tables showing co-membership between parents and children in the household, that percentage is always lower than the percentage identified as a parent. First, rates of infant and child mortality in the population may mean that children could have died prior to 01 January 2001, although the individual is still coded as a parent in ACDIS. Secondly, high rates of orphanhood, particularly paternal orphanhood, mean that many children are fostered and not living in the same household as a surviving parent. Thirdly, the social separation of parents and children in this population is common, with many children living with grandparents. One recent study in the population found that only 27% of non-orphans were living with both parents (Hosegood, Floyd et al. 2007). In a context of low marriage rates, the co-membership of fathers with children is much lower than of mothers with children, which reduces the overall percentage of parents living with children. This analysis introduced addition constraints on the linking of parents and children by restricting the households of multiple members, and by using only one date of reference – 01 January 2001 – for the definition of household co-membership between parents and children. Thus the variable indicates whether either the mother or the father was a member of the same household of at least one child in the household of which they were a member on 01 January 2001.

I also examine household-level characteristics, beginning with composition variables such as household size, the sex and number of pension-eligible adults in household (ages 60 and older for women, and 65 and older for men), the number of children in household by age grouping, the number working age adults (defined as aged 18-59 for women and 18-64 for men) and a household dependency ratio defined as the ratio of dependents (children aged 0 to 17 and pension-eligible adults) to working-age

adults. (Only the household compositional variables that were significantly associated with migration or residency status at $p < .05$ are shown in the tables.) I also examine the number of adult deaths in the household in the period by age grouping (up to age 40, or older than age 40) sex and cause of death (AIDS vs. non-AIDS), whether the household had access to infrastructure such as grid or generator electricity, piped (public or private) water and a flush or chemical toilet, and a measure of household wealth in assets. The household asset scale is simply a sum of the number of up to 17 assets in the household, divided into population tertiles to provide a lower-, middle- and higher-level grouping of household economic status on the basis of assets.

Statistical analysis. The individual and household population characteristics are described, chi-squared tests are used to test group differences (such as residency status) for categorical variables, and T-tests are used to examine group differences in mean characteristics, assuming unequal variances and under the null hypothesis that differences are equal to zero. Logistic and ordinal logit regression models are used to characterize sex differences in the patterns of various migration events. For the basic logit model, the logistic transformation of the success probability p is given by

$$\text{logit}\ (p_i) = \log\ (p_i / 1 - p_i).$$

Logit (p_i) equals $x_i'\beta$, where β denotes the (K+1) x 1 vector of regression coefficients to be estimated (Powers and Xie 2000). In this chapter, I use simple logistic models including only age and sex as independent variables. The cumulative probability of the ordered logit model, a 'proportional odds model', is written as

$$C_{i,j} = \Pr\ (y_i \leq j \mid x_i) = \exp\ (\alpha_j = x'_i\ \beta) / 1 + \exp\ (\alpha_j = x'_i\ \beta).$$

The ordered logit model assumes proportionality: the effects of *x* are invariant with respect to each outcome (dependent variable category) (Ibid.) In this chapter, I again only show age-adjusted sex differences in the ordered logs odds of presence in the household (the categorical dependent variable.) I also use the T-test to compare means of the number of types of migrations in the populations of men and women, assuming unequal variances and under the null hypothesis that differences are equal to zero. Given the large population size for these analyses, the significance level for all statistical tests is set to 99%.

Results

Socio-economic and demographic characteristics of resident and non-resident household members. Tables 2.1A and 2.1B show the information derived from the HSE and other ACDIS sources on the characteristics of members of one household on 01 January 2001 by their residency status on that date. The data shown in these tables are restricted to the 39,913 adults who participated in the HSE; unweighted frequencies and weighted percentages (using the propensity score weight) are shown. As shown, the sex composition of the non-resident population is quite different from that of the resident: 56.9% of non-residents are male, compared to the 39.7% of residents who are male. Non-residents tend as well to be younger than the resident members of households, with 33.9% of non-residents comprising the largest eight-year adult age group (ages 18 to 25), compared to 28.9% in that group among residents.

A smaller proportion were currently married (15.6% vs. 25.5% of residents), and 56.9% of non-residents reported having a regular non-marital partner, compared to 40.7%

of residents. Various measures of household socio-economic status are also shown in Table 2.1A and 2.1B, and the data demonstrate high poverty conditions for households in the surveillance area, as described elsewhere (e.g. Case & Ardington, 2004.). Unemployment is high: only 26.5% of resident individuals have full-time employment. A much larger proportion of non-residents had full-time employment (53.6%), reflecting a common purpose for residence away from the rural household. Some 42% of non-residents, versus nearly 70% of residents, were unemployed.

Reflecting the educational disadvantage in South Africa's former "homelands", a minority of the population had reached Standard 10 (Matric), an important educational milestone in South Africa (the secondary school graduation). A higher proportion of non-residents (25.1%) than residents (13.7%) had reached Standard 10; however this is likely to be largely a cohort effect, reflecting the younger age distribution of the non-resident population. Involvement in secondary education is prolonged, in a local context of high unemployment: 10.7% of resident and 4.7% of non-resident adults aged 18 and older reported they were currently in full-time study, virtually all in secondary education. Finally, a lower percentage of non-residents (58.4%, vs. 70.8%) were identified in ACDIS as a mother or father, and a lower percentage were identifiable in ACDIS as a parent to the children in the household in which they were a member; this finding also reflects the younger age distribution of the non-resident population.

The migration patterns of residents and non-residents are somewhat tautological, since household members must be *non-residents* if they migrate into the surveillance area, while only household members who are *residents* can migrate internally or out-migrate from the area, at a given point in time. Thus within a two-year period, in-migration

predominated among non-residents (16.1%) and out-migration among residents (16.9%). However, the residency status of individuals in the population changes over time; thus the 5.4% of residents who in-migrated within two years of the HSE represent a group who had out-migrated, become non-resident, and in-migrated to become resident again in that time period. Similarly, the 4.4% of non-residents who out-migrated within two years of the HSE represent a group who had both in-migrated and out-migrated in the period.

The presence pattern of nights in the home in the previous six months provides yet a more nuanced view of the levels of presence and mobility of residents and non-residents: far from the dichotomous at home versus away from home status that the 'residency' category implies, the data show a continuum of mobility by residency status, and show that the "stable" population is itself highly mobile. Only 50.9% of non-residents were in the home few or no nights in the previous several months, while conversely, *fewer than half* of residents (46.8%) were at home every night. Among residents, almost 10% were present in the home only about half or fewer of the nights in the previous six months. Similarly, the measure of whether the individual was at home on the night prior to the visit did not necessarily correspond well with residency status: while 91.9% of residents were at home on the night prior to the most recent surveillance visit, a full 27.4% of non-residents (who would be expected to be away) were as well.

The household characteristics of resident and non-resident household members must be interpreted with care: the household characteristics of non-resident members refers to the household of which the individual is a member in the DSA; in other words, the 'sending' household. As shown in Table 2.1A, these households were poorer than the households of residents; they had more limited access to community infrastructural

resources such as piped public or private drinking water, flush toilets, or grid or generator electricity. The number of household assets, divided into tertiles, were somewhat similar for the two populations, though non-residents' households somewhat predominated in the middle quantile of assets. The sex and number of pension-eligible adults in the household did not significantly differ by residency, there this variable was not shown in Table 2.1.

While information on adult mortality in the household showed similarity for the populations, a somewhat higher proportion of non-residents than residents were members of households in which one or more adults died under the age of 41, while the levels of older adult deaths were similar for both populations. This difference appears due to the contribution of AIDS to mortality in the households of non-residents: as shown in Table 2.1B, non-residents had households with a mean number of 0.39 deaths due to AIDS over the period of 01 January 2001 through 01 Jan 2007, compared to a mean number of 0.33 adults deaths due to AIDS in the households of resident members over the same period. The level of mortality *not* due to AIDS in the households of both populations was more similar. Table 2.1B also shows a comparison of the household composition of residents and non-residents who participated in the HSE. Non-residents' households were larger (with a mean of 10.65 individuals, vs. 9.54 in the households of residents), with higher mean numbers of children, and a higher mean number of pension-eligible adults. The mean number of working age adults was also higher among non-residents, rendering the household dependency ratio somewhat lower for these individuals' households (0.71, vs. 1.17 for residents' households).

The descriptive findings here are suggestive of poorer households within the DSA

maintaining connections to, and receiving support from, non-resident household members, who are more likely to be employed than resident members, and are more likely to contribute to the support of their relatively larger pool of household dependents. At the same time, the somewhat higher proportion of pension-eligible adults (particularly women) among the households of non-residents is also suggestive of the relaxation of childcare restraints to migration. The characteristics of migrants- those who in-migrated, out-migrated, or moved internally within the DSA- are shown in Tables 2.2A, 2.2B and 2.2C in comparison to those who did not participate in these migration flows.

Socio-economic and demographic characteristics associated with internal and out-migration of residents. Table 2.2A shows comparisons, among residents, of the characteristics of those who internally migrated with those who did not, and those who out-migrated and did not, within the two-year period following the HSE survey. Only the characteristics significantly associated with either of the two migration flows were included in the table; these characteristics are shown as proportions of the total within each migrant category. To summarize, having internally migrated was significantly associated with female sex, younger age, being unmarried, a higher education level or being a current student, not being a parent, lower household socio-economic status, and having mourned the death of another adult member of the household. Compared to those who didn't internally migrate, a greater proportion of internal migrants were female (69.9% vs. 59.8%) and in the youngest age group (40.2% of internal migrants were aged 18 to 25 compared to 28.3% of those who didn't internally migrate). Internal migrants were much less likely to be married (9.1% vs. 26.4% among non-migrants), and a greater proportion were in a regular, non-marital partnership (57.1% vs. 39.8%). Compared to

those who did not internally migrate, migrants had somewhat higher levels of education and a greater percentage were current students. Those who did not internally migrate had a higher number of household assets than those who did, and were more likely to have electricity access (51.7% vs. 45.3% for migrants). They were somewhat more likely to have households with at least one pensioner of both sexes (7.5% vs. 5.6% of migrants), while a greater proportion of households of migrants had at least one female pensioner (30.7% vs. 28.4%).

The final row of Table 2.2A gives the percentages of residents for whom another adult in their household died within two years of the HSE visit date. As shown, 19.6% of those who did not internally migrate vs. 23.2% of migrants had mourned the death of another adult in their household within two years. A finer examination of the data revealed that for 147 of the 311 internal migrants who mourned the death of another adult in the household within two years after the HSE visit (47.3%), at least one death of another adult household member occurred before the date of their first internal migration in the two year period.

The right half of Table 2.2A compares the characteristics of residents who out-migrated with those who did not. In summary, out-migrants were more likely to be male, younger, unmarried (but in a regular non-marital partnership) and unemployed; they had a higher education level, a lower number of household assets and were likely to have electricity in the home; and were less likely to have a pensioner in the home. Although statistical comparisons in the table are made with reference to non-migrants, I note here the key apparent distinctions between residents who internally migrated and those who out-migrated, among the residents: chief among them is a sex difference, with females

comprising the bulk of internal migrants and males comprising a slight majority of out-migrants. Out-migrants were apparently more likely to have no partner at all (33.8% vs. 29.2% of internal migrants) while internal migrants were more likely to have a regular non-marital partner (57.1% vs. 49.8% among out-migrants.) Internal migrants (26.4%) were more likely to have full-time employment (in the area, most likely, as it would tie them to a shorter-distance move) than were out-migrants (21.2%). Greater proportions of the internal migrants than of out-migrants had a lower level of education, and a greater proportion were parents. They also had a relatively lower number of household assets. Finally, a higher proportion of internal migrants (30.7%) than out-migrants (26.8%) originated from households with at least one female pensioner.

Socio-economic and demographic characteristics of in-migrants to the DSA, among non-residents, compared to non-residents who did not in-migrate. Table 2.2B shows the characteristics associated with in-migration to the DSA within two years following the HSE, among those who were non-resident at the time of the HSE. Note that the comparison here is only between those who in-migrated and those who did not. We know little about the latter group: ACDIS does not have information on their mobility patterns other than the pattern of return to the DSA. That is, if a non-resident changed residences outside of the DSA over the two year period, moving for instance from Richard's Bay to Durban to Gauteng, none of those residence changes would be recorded. Thus, the comparison category of non-residents who did not in-migrate cannot be said to represent a more 'stable' category of non-residents. Rather, the comparison perhaps better reveals differences between those non-residents who may have a greater dependence on, a closer tie to, or a greater responsibility for others within the rural

household (as measured by their return to residence in the area), compared to those who did not return to a residence in the DSA within the two-year period.

Relative to those who did not in-migrate, those who did were more likely to be female (49.1%, vs. 42.5%), to be in the youngest age group of 18 to 25 (46% vs. 32.8%), and less likely to be married (13.2% vs. 16.4%). They were much less likely than the non-migrants to have full-time employment (38.3% vs. 55.9%), and more likely to be a full-time student (the education levels of two groups were similar overall). They were more likely to be a parent (63.6%, vs. 57.2% of non-in-migrants). The household infrastructure of those who in-migrated was better than that of the households of non-residents who did not return: 47.5% had an electricity source (vs. 42%). The in-migrants were less likely than the non-migrants to have one or more pension-age-eligible adults in the household (of either sex). Relative to the non-residents who remained so, a higher percentage of in-migrants (24.3%, vs. 22.6% of non-in-migrants) mourned the death of another adult member of the household within the two years following the HSE, although this difference was not statistically significant (and therefore is not shown). Of the 543 non-resident in-migrants comprising this 24.3%, 252 (46.4%) experienced this loss prior to the date of their out-migration.

Table 2.2C shows additional household characteristics of migrants and non-migrants. Here I compare three groups of residents, those who neither internally nor out-migrated within 2 years after HSE, those who internally migrated, and those who out-migrated. Among residents, those who internally migrated and out-migrated had a larger mean household sizes (9.54 and 10.1, respectively) at the HSE visit date than the stable residents (9.43). Migrants' households had similar mean number of children than stable

residents, although out-migrants had a somewhat higher mean number of children aged 10-17 (2.12) relative to stable residents (2.09). Stable residents had the highest mean number of pension-eligible adults, and the lowest mean number of working-age adults. Thus the stable residents had a higher household dependency ratio than the two groups who later migrated (1.2, vs. 1.12 and 1.03, respectively). Those that out-migrated after the HSE had a higher number of full-time employed adults in their households (1.7) at the HSE visit date, relative to those that remained stable (1.56) and those that internally migrated (1.57), suggesting that in the income of another adult in the household may have relaxed a constraint on the out-migration of many individuals.

In the final column of Table 2.2C, measures of central tendency for the non-residents' households are shown, again comparing the in-migrants and non-in-migrants. As shown, the in-migrants had households with a composition that was overall similar to those of non-residents who did not in-migrate. The greater difference in the two groups was seen in the number of full-time employed adults in the household, with a lower mean number among in-migrants (1.88) compared to non-in-migrants (2.15), again reflective of the stronger likelihood of employed non-residents remaining in their residence outside of the DSA.

Sex differences in patterns of migration and mobility. Table 2.3 and Figures 2.1 through 2.4 show sex differences in the patterns of migration and mobility in the total population of adults who were members of a single household on 01 January 2001. A full range of measures of migration and mobility, from the global to the more specific and recent, are shown. The top half of Table 2.3 highlights measures that I believe to be similar to those commonly used in many studies of migration and in censuses; these are

labeled “Traditional measures”. Residency status is one such measure as it corresponds, approximately, to the definition often used to denote labor migrancy: an individual is considered to be a member of a household, but lives elsewhere. Presence in the household on the night previous to a visit is a measure also often used as a proxy for short-term or temporary migration or mobility. Finally, we may consider out-migration to be a “traditional” measure, as it corresponds approximately to a definition of migration as a long-distance, permanent change of residence.

In the bottom half of Table 2.3 I denote several other measures used in this study which I have labeled “Newer” measures, in that they are more rarely used and have only in recent years emerged in the context of the development of demographic surveillance sites. The distinction, in ACDIS, between out-migration and internal and in-migration is highlighted here; and, I argue, the measures of very localized internal migrations, and in-migrations to local areas, mark an innovation in way in which migration is conceptualized. The measure “Any change in residence” is “Newer” in that is encapsulates not only long-distance, permanent moves away from a local area, but also encapsulates local moves and in-migrations. Finally, a measure of the level of presence in the household provides a more nuanced view of the pattern of mobility of the population than is commonly captured in traditional migration measures. I have shown, in Table 2.3, the results of descriptive analyses and statistical tests of sex differences in patterns of migration and mobility in the total population, and where relevant, sub-populations of residents and non-residents. Finally, in the right columns of the table I denote whether the measure produces an estimate in which men predominate, women predominate, or slight-to-no sex differences are seen.

As shown, a greater percentage of males than females were non-resident household members (55.4% vs. 44.6%); and from a logistic regression model of residency status with age and sex as independent variables, men had 44% lower age-adjusted odds of being a resident, relative to women. A greater percentage of men than women (54.4% vs. 45.6%), also, were absent from the household on the night previous to the visit. Men's age-adjusted odds of being in the home were some 38% lower, compared to women (OR=0.62). Finally, male residents were more likely to have out-migrated relative to their female counterparts; out-migrants were somewhat more likely to be male (50.3%) than female (49.7%); the difference was small but statistically significant. Their period prevalence of individual out-migration was 21.2% (vs. 13.9% in women) (column percentages not shown in Table 2.3, but are shown in Figure 2.1) and male residents had an approximately 43% higher odds of out-migrating, adjusting for age, relative to their female counterparts.

The sex differences were reversed for the other two patterns of individual migration measured in ACDIS: residents who internally migrated were more likely to be female (69.4%) than male (30.6%). The period prevalence of individual internal migration was 6.1% in female residents and 4.0% in male residents (shown in Figure 2.1); and males had a 41% lower age-adjusted odds of internally migrating in the two-year period. Similarly, of non-residents, those who in-migrated were somewhat more likely to be female (50.8%) than male (49.2%). The period prevalence of in-migration among female non-residents was 19.0%, and in male non-residents (14.8%) (shown in Figure 2.1) and the age-adjusted odds of in-migration were some 23% lower for men relative to women. Figure 2.1 graphically displays the data on 2-year prevalence levels of

out-migration, in-migration and internal migration for men and women, respectively.

As shown in the lowest row of the table, 16,580 adults of both sexes (36.3% of the total adult population) experienced at least one change of residence of any type in the two-year period. Some 47% of men and 53% of women had any change in residence; this difference was not significant (OR=1.03, with a 99% confidence interval of 0.98-1.09). Below, the table shows sex differences in more a nuanced view of mobility, the pattern of presence in the household in the past six months. Age and sex are used as independent variables in an ordinal logit model of the past six-month presence pattern in order to generate age-adjusted probabilities of the four levels of recent presence in the household. While the categories "every night" and "few or no nights" roughly correspond to the measure of resident vs. non-resident membership status and show, similarly, that males were more absent than females, including age in the model reduced the level of apparent sex difference: The probability of being present every night was 0.37 for women vs. 0.27 for men, and few or no nights was 0.18 for women and 0.25 for men. However, the categories of "most nights" and approximately half of the nights" in the past four month reveal no dramatic significant sex differences: men and women were approximately equally likely to be present most nights (0.34 and 0.33, respectively) or approximately half of the nights (0.14 and 0.12, in men and women, respectively). In sum, as shown in Table 2.3, the use any of several convention measures of migration in this population would present a view of migration processes that is biased towards the measure of male migration. Use of alternative measures complicates this view: in some patterns of migration, women predominate. Global measures that would capture well both men's and women's patterns of movement will tend to erase any apparent sex

differences in migration in this population. Detailed, nuanced measures reveal the full extent of sex differences in migration and mobility. Clearly the data exemplify why it is necessary to interrogate the measures typically used to measure population mobility, in order to correctly characterize both men's and women's involvement in migration processes.

While the analyses presented in this chapter have focused on individual migrations, ACDIS also records the migrations of full households. As there were very few household in-migrations among non-residents (n=51 in the two-year period), these data are not shown. Table 2.4 shows data on the two-year prevalence of household internal migrations and external migrations of men and women who were residents on 01 January 2001. Both row and column percentages are shown in the table, to convey an overall view of the prevalence of these types of migration in the population of residents and also to elucidate sex differences. Only 3% of residents, or 3.2% of women and 2.7% of men, had a household internal migration in the two year period. Similarly, 3.1% of residents had an external household out-migration in the period, but the sex composition of those who experienced this type of migration differed: 3% of women and 3.2% of men had an external household migration. Overall, women predominate in the population of residents; yet they predominate to a greater degree among those who had an internal household migration, and to a somewhat lesser degree among those who had an external household migration.

In Figures 2.2 and 2.3, the populations of men and women (which total 47,717 individuals) are classified by eight mutually-exclusive categories of individual migration flows experienced in the two-year period following 01 January 2001 or the HSE visit. In

women, 77.6% experienced no individual change in residence, followed by 7.1% who experienced one out-migration only. The next largest categories were 'In-migration only' and 'Internal migration only' (both 5.3%), followed by 'In and out-migration only' (3.6%). In men, the rank order of magnitude for the migration categories differs somewhat. A slightly smaller percentage had no individual migration in the two year period (77.2%), but as for women this category predominates, followed by out-migration only (9.2%, higher than for women). The next largest category was 'In-migration only' (6.0%). A smaller percentage of men (3.0%) than women (5.3%) experienced an individual internal migration only. The third largest category for men was 'In- and out-migration only' (4.1%), somewhat higher than women's prevalence of this type of flow (3.6%); and a higher percentage of women than men experienced the other flows involving at least one internal migration.

Finally, Figure 2.4 displays the sum of migrations over a two year period, for each of three types of migration, for men and women As shown, women had a significantly higher mean number of internal and in-migrations, and men had a higher mean number of out-migrations. Overall, men appeared to have a slightly higher mean number of migrations than women, but this difference was not statistically significant.

Limitations. The limitations of the data analyses presented in this chapter have been discussed throughout. As the data are quite complex, clarity of presentation required a sequential sub-setting of the population, from the selection of single household members (and exclusion of multiple members), to the selection of a population that participated in a survey that provided information on socio-economic characteristics. I adjusted for selection bias in the HSE survey on the basis of known covariates using the

propensity score weighting method; but the method does not adjust for bias on the basis of 'unobservables'; thus the extent of remaining selection bias in estimates using the HSE data is unknown. We may be reassured, however, that the estimates are reasonably valid given that a relatively small proportion of the population opted out of the questionnaire, and the numbers of individuals with complete data are quite high.

I have chosen, for the sake of parsimony, to focus these analyses on the individual migration behaviors of the population, to the detriment of a fully nuanced description of the characteristics of individuals who experienced household migrations; only summary data are presented in Table 2.4. Furthermore, the migration of children, whether as part of households or whether independently sent for purposes of schooling or fostering, is not explored in this chapter.

Information on the migration behavior of non-resident household members is quite limited, in that only their in-migration to the DSA (and not their migration to other places) is recorded in ACDIS. Finally, the scope of this chapter is limited largely to a description of the migration behaviors of a population at one period in time, with an initial examination of the sex differences in these patterns and behaviors. The subsequent chapter of this dissertation focuses on the modeling of sex differences in the determinants of migration; a longitudinal view of the data is provided. This will permit an exploration of the impact of deaths in households on the migration behavior of individuals in those households- an exploration that is beyond the scope of this chapter.

Discussion. The findings shown in this chapter describe a population of adults living in an area in the central coast of KwaZulu-Natal, South Africa; an area that in many ways is typical of the rapidly changing, and urbanizing, peripheral areas of the

formerly rural ‘homelands’ of the nation. The findings reveal a population that is very much ‘on the move’, with a large proportion of household considered to be living away from the home, yet retaining a significant tie to it. Remaining resident members of households, who are disproportionately female, are also highly mobile. The migration behaviors of individuals are patterned by their demographic and socio-economic characteristics and those of their households. In general, as seen is prior research from the region and across the globe, migrants tend to be younger, to be unmarried, and to have a somewhat higher education level compared to their non-migrant counterparts. Being unemployed appears associated with a decision later migrate from the area, while being employed outside of the area appears to repress a return migration to the rural DSA.

As described previously (Hosegood, Vanneste et al. 2004), mortality is high in the population. A full 13.5% of the population of adults who were members of one household at the beginning of 2001 had died before the beginning of 2007. Non-residents in particular had households disproportionately hard hit by young adult deaths over that six-year period, and the number of adult deaths due to AIDS was higher than due to other causes, especially among non-residents. Among both residents and non-residents, the percentages of migrants who mourned the death of at least another household member within two years of the HSE visit was higher than the same percentages among non-migrants, suggestive of a relationship between adult deaths in the household and subsequent migration events. A thorough investigation of this relationship is beyond the scope of exploration in this chapter, but is explored subsequently.

The findings shown here also highlight the rarity of marriage, whether civil or traditional, in this population. Only 20.4% of all adults aged 18 and older who were

members of one household at the beginning of 2001 were currently married, although most adults are parents. Among residents, those who individually internally migrated and out-migrated were much less likely to be married, and of non-residents only a somewhat smaller percentage of in-migrants were married compared to those who remained non-resident within the two-year period. Information on the household migrations of residents are suggestive that women were more likely than men to participate in internal household migrations, but not external household migrations. The relationship between marriage and migration, and the extent to which female migration is 'associational' is explored further in the next chapter.

In a departure from the previous research, the findings presented in this chapter do not lead to the general conclusion that migrants tend to be male. Rather, the degree to which women's mobility is adequately recognized depends upon how mobility and migration are defined, and how data are collected and analyzed. By some measures, males are more likely than females to migrate, and by others the opposite appears to be true. The most conventionally used measures of migration, whether it be a permanent change in residence at some distance from the origin, or non-resident household membership, or presence in the household on the night prior to a visit, are ones which appear to better capture the mobility patterns of men; and men predominate in these categories of migrants. The more nuanced measures used in this study from a demographic surveillance system, including measures of in-, out- and internal migration and household presence pattern within a local predominantly rural area, erase the apparent predominance of males in migration, and reveal a similar overall level of mobility among men and women. The findings here underscore the fact that, had

conventional measures of migration and mobility been employed in this study, migration and mobility would have been characterized as a processes in which men predominantly participate. The more detailed and innovative measures used in this study address this potential bias, and reveal significant sex differences in the patterns and types of migration and mobility: confirming the findings of the small extant body of research on female migration in the region, women appear overall to move more often closer to home, and to be more likely to return to rural homesteads. The next chapter of this dissertation builds upon the analyses presented here, to explore sex differences in the determinants of various measures of mobility and migration in the population.

The data presented here do provide support for the proposition that a 'feminization of internal migration' has taken place in South Africa. It may in fact be a key facet of the processes of rapid urbanization and globalization taking place in southern Africa today, and is likely to be both a cause and a consequence of contemporary transformations in gender. Women's mobility is related not only to changes in gender role expectations and social norms, but also to changes in the opportunity structures to which men and women are subjected, the spheres and spaces through which women and men move and eke out a livelihood, and the ideals and expectations that men and women bring to relationships to each other and the project of raising families.

Table 2.1A: Characteristics of the population of adult members of households on 01 January 2001 who participated in first HSE (n=39,913), by residency status on that date

Characteristic	Non-resident (n=13,644)		Resident (n=26,269)		
	N	Weighted %	N	Weighted %	*p*
Individual characteristic					
Sex					***
Female	5,943	43.1	15,896	60.3	
Male	7,701	56.9	10,373	39.7	
Age group (8-year)					***
18-25	4,773	33.9	7,760	28.9	
26-33	4,017	30.1	4,813	18.7	
34-41	2,439	18.4	4,031	15.8	
42-49	1,292	9.5	3,041	11.8	
50-57	629	4.5	2,166	8.4	
58-65	334	2.4	1,890	7.0	
66 and older	160	1.1	2,568	9.3	
Partnership pattern					***
No current partner	2,770	21.3	7,716	30.1	
Marital partner	2,102	15.6	6,688	25.5	
Regular non-marital partner	7,479	56.9	10,432	40.7	
Casual partner	866	6.3	1,005	3.6	
Employment status					***
Full-time	7,225	53.6	6,844	26.5	
Part-time	543	4.0	1,057	4.1	
Unemployed	5,857	42.4	18,343	69.5	
Education level					***
None or <1 year	1,379	10.3	5,863	22.4	
Standard 1-5	3,350	25.1	7,267	28.1	
Standard 6-9	3,595	27.0	5,474	21.2	
Standard 10 (Matric)	3,362	25.1	3,560	13.7	
Diploma, Bachelor's or Master's	619	4.7	992	3.9	
Full-time student	1,089	7.8	2,846	10.7	
Is a parent	7,950	58.4	18,486	70.8	***
Linked as parent to children in his/her household	2,882	21.3	7,652	29.5	***

Table 2.1A continued on next page

Table 2.1A, continued:

Characteristic	Resident (n=26,269)		Non-resident (n=13,644)		
Migration and mobility	**N**	**%**	**N**	**%**	***p***
Any change of residence before 01 Jan. 2007	4,601	33.3	9,754	36.4	***
Any individual in-migration in 2 yrs after HSE	2,233	16.1	1,488	5.4	***
Any individual out-migration in 2 yrs after HSE	603	4.4	4,445	16.9	***
Nights at home, past 6 months					***
Every night	1,233	9.1	12,278	46.8	
Most nights	1,714	12.6	11,622	44.3	
Approximately half	3,735	27.4	1,231	4.6	
Few or no nights	6,962	50.9	1,138	4.2	
At home, night prior to visit	3,713	27.4	24,113	91.9	***
Death in period					**
Died before Jan. 1, 2007	1,691	12.5	3,562	13.5	
Alive throughout period	11,953	87.5	22,707	86.5	
Household characteristics					
Drink water source					***
Piped (private/public)	4,716	34.6	10,617	40.7	
Other source	8,910	65.4	15,641	59.3	
Sanitation: Flush toilet/VIP	1,077	7.8	2,719	10.5	***
Other or none	12,567	92.2	23,550	89.6	
Electricity: No source	7,796	57.1	12,852	48.7	***
Has electricity source	5,848	42.9	13,417	51.3	
Number of household assets					**
0 to 2	3,688	26.9	7,234	27.4	
3 to 6	6,128	45.0	11,346	43.2	
7 to 17	3,828	28.1	7,689	29.5	
≥1 females in home died at age 18-40 in period	2,565	18.8	4,291	16.4	
≥1 males in home died at age 18-40 in period	2,466	18.2	4,104	15.8	
≥ 1 females in home died at age over 40 in period	2,332	17.1	4,207	15.8	**

Table 2.1A notes: Only characteristics significantly associated with residency status shown. *** p <.0001; ** p <.001. Chi-squared tests of association with 99% CI used, to test null hypothesis that differences by residency status = 0. Percentages are weighted with the propensity score weight to adjust for selection bias

in HSE participation on the basis of the observable covariates of participation.

Table 2.1B: Characteristics of the population of adult members of households on 01 January 2001 who participated in first HSE, by residency status on that date (Central tendency measures)

Individuals' household characteristics	Resident (n=26,269)			Non-resident (n=13,644)			
	Mean	SD	Median (Range)	Mean	SD	Median (Range)	*p*
Household size	9.54	5.15	9 (1-42)	10.65	5.13	10 (1-42)	***
Children ages 0-4 in household	1.29	1.26	1 (0-10)	1.35	1.31	1 (0-10)	***
Children ages 5-9 in household	1.33	1.20	1 (0-9)	1.39	1.25	1 (0-9)	***
Children ages 10-17 in household	2.10	1.61	2 (0-12)	2.22	1.65	2 (0-12)	***
Household dependency ratio	1.17	0.88	1 (0-9)	1.05	0.71	1 (0-9)	***
Full-time employed adults	1.58	1.44	1 (0-10)	2.10	1.61	2 (0-10)	***
Adult AIDS deaths in period	0.33	0.63	0 (0-5)	0.38	0.66	0 (0-5)	***
Adult non-AIDS deaths in period	0.31	0.56	0 (0-4)	0.32	0.58	0 (0-4)	**

Table 2.1B notes: Two-sample T-tests used to compare mean values for residents and non-resident, under the hypothesis that differences=0. Unequal variances and 99% CI assumed. Only characteristics significantly associated with residency status shown. *** p <.0001; ** p <.001. Percentages are weighted with the propensity score weight.

Table 2.2A: Characteristics of the population of adult members of households on 01 January 2001 who participated in first HSE, by individual migration type within two years following the HSE visit (Percentages)

Characteristic (Percentages)	RESIDENTS (n= 26,269)								
	No internal migration within 2 years*		Any internal migration within 2 years		*p*	No out-migration within 2 years*		Any out-migration within 2 years		*p*
Individual characteristics	N	Percent	N	Percent		N	Percent	N	Percent	
Sex					***					***
Female	14,953	59.8	943	69.9		13,732	62.5	2,164	48.7	
Male	9,973	40.1	400	30.1		8,092	37.5	2,281	51.3	
Age group (8-year)					***					***
18-25	7,208	28.3	552	40.2		5,226	23.7	2,534	56.4	
26-33	4,468	18.3	345	26.4		3,847	18.1	966	22.2	
34-41	3,834	15.8	197	15.3		3,578	16.8	453	10.4	
42-49	2,940	12.0	101	7.6		2,800	13.0	241	5.5	
50-57	2,120	8.7	46	3.5		2,046	9.5	120	2.8	
58-65	1,848	7.2	42	3.0		1,822	8.1	68	1.5	
66 and older	2,508	9.6	60	4.0		2,505	10.8	63	1.4	
Partnership pattern					***					***
No current partner	7,335	30.2	381	29.2		6,263	29.4	1,453	33.8	
Marital partner	6,567	26.4	121	9.1		6,290	28.6	398	9.1	
Regular non-marital partner	9,684	39.8	748	57.1		8,270	38.9	2,162	49.8	
Casual partner	940	3.7	65	4.7		682	3.1	323	7.3	
Employment status										***
Full-time	6,496	26.5	348	26.4		5,905	27.5	939	21.2	
Part-time	1,015	4.1	42	3.1		891	4.1	166	3.7	
Unemployed	17,391	69.4	952	70.6		15,012	68.4	3,331	75.2	

Table 2.2A continued on next page

Table 2.2A, continued:

Characteristics	No internal migration within 2 years*		Any internal migration within 2 years		*p*	No out-migration within 2 years*		Any out-migration within 2 years		*p*
	N	Percent	N	Percent		N	Percent	N	Percent	
Education level					***					***
None or <1 year	5,646	22.7	217	16.1		5,463	24.9	400	9.1	
Standard 1-5	6,903	28.1	364	27.6		6,339	29.4	928	21.0	
Standard 6-9	5,156	21.0	318	24.2		4,300	20.2	1,174	26.6	
Standard 10 (Matric)	3,358	13.7	202	15.0		2,622	12.3	938	21.4	
Diploma, Bachelor's or Master's	933	3.8	59	4.7		863	4.1	129	3.0	
Full-time student	2,678	10.6	168	12.4		2,001	9.2	845	18.9	
Is a parent	17,566	70.1	920	68.3		16,223	74.5	2,263	51.2	***
Parent to children in household	7,334	29.8	318	23.9	***	6,864	31.6	788	18.0	***
Electricity					***					***
Has electricity source	12,810	51.7	607	45.3		11,277	51.9	2,140	48.1	
Number of household assets					***					
0 to 2	6,763	27.0	471	34.9		6,061	27.5	1,173	26.4	
3 to 6	10,766	43.2	580	43.1		9,399	43.1	1,947	43.6	
7 to 17	7,397	29.9	292	22.0		6,364	29.4	1,325	30.0	
Sex & no. of pension-eligible adults					*					***
1 or more, both sexes	1,965	7.5	78	5.6		1,751	7.7	292	6.4	
1 or more, male only	1,185	4.7	61	4.5		1,068	4.8	178	4.0	
1 or more, female only	7,154	28.4	416	30.7		6,365	28.8	1,205	26.8	
None	14,622	59.4	788	59.3		12,640	58.8	2,770	62.8	
Death of another adult in household in 2 yrs after HSE	4,896	19.6	311	23.2	**	4,276	19.6	931	20.9	*

Notes: Data shown for the n= 26,269 resident members of households on 01 Jan. 2001 who participated in the HSE; percentages are weighted.

Table 2.2B: Characteristics of the population of adult members of households on 01 January 2001 who participated in first HSE, by migration within two years following the HSE visit

Characteristic	NON-RESIDENTS (n= 13,644) No in-migration within 2 years		Any in-migration within 2 years		*p*
Individual characteristics	N	Percent	N	Percent	
Sex					**
Female	4,846	42.5	1,097	49.1	
Male	6,565	57.5	1,136	50.9	
Age group (8-year)					***
18-25	3,747	32.8	1,026	46.0	
26-33	3,445	30.2	572	25.6	
34-41	2,147	18.8	292	13.1	
42-49	1,133	9.9	159	7.1	
50-57	522	4.6	107	4.8	
58-65	273	2.4	61	2.7	
66 and older	144	1.3	16	0.7	
Partnership pattern					***
No current partner	2,224	20.1	546	25.2	
Marital partner	1,817	16.4	285	13.2	
Regular non-marital partner	6,323	57.2	1,156	53.4	
Casual partner	690	6.2	176	8.1	
Employment status					***
Full-time	6,371	55.9	854	38.3	
Part-time	465	4.1	78	3.5	
Unemployed	4,559	40.0	1,298	58.2	
Education level					***
None or <1 year	1,146	10.2	233	10.6	
Standard 1-5	2,811	25.1	539	24.6	
Standard 6-9	3,037	27.1	558	25.4	
Standard 10 (Matric)	2,825	25.2	537	24.5	
Diploma, Bachelor's or Master's	543	4.9	76	3.5	
Full-time student	838	7.5	251	11.4	
Is a parent	6,530	57.2	1,420	63.6	***

Table 2.2B continued on next page

Table 2.2B, continued:

Characteristic	No in-migration within 2 years		Any in-migration within 2 years		*p*
	N	Percent	N	Percent	
Electricity					
Has electricity source	4,787	42.0	1,061	47.5	***
Number of household assets					*
0 to 2	3,099	27.2	589	26.4	
3 to 6	5,162	45.2	966	43.3	
7 to 17	3,150	27.6	678	30.4	
Sex and number of pension-eligible adults					**
1 or more, both sexes	933	8.2	146	6.5	
1 or more, male only	539	4.7	88	3.9	
1 or more, female only	3,439	30.1	656	29.4	
None	6,500	57.0	1,343	60.1	

Notes: Estimates in Table 2.2B are for the n=13,644 non-residents who participated in the HSE; percentages are weighted with the propensity score weight.

Table 2.2C: Characteristics of the population of adult members of households on 01 January 2001 who participated in first HSE, by individual migration type within two years following the HSE visit (Measures of central tendency)

Household Characteristic	RESIDENTS (n= 26,269)									NON-RESIDENTS (n= 13,644)					
	No individual internal or out-migration within 2 years after HSE			Any individual internal migration within 2 years after HSE			Any out-migration within 2 years after HSE			No in-migration within 2 years after HSE			Any in-migration within 2 years after HSE		
	Mean	SD	Median (Range)	Mean	SD	Median (Range)	Mean	SD	Median (Range)	Mean	SD	Median (Range)	Mean	SD	Median (Range)
Household size	9.43	5.13	9 (1-42)	9.54	5.41	9 (1-42)	10.1	5.12	9 (1-42)	10.69	5.17	10 (1-42)	10.45	4.94	10 (1-38)
Children ages 0-4	1.27	1.26	1 (0-10)	1.40	1.27	1 (0-10)	1.33	1.27	1 (0-10)	1.35	1.31	1 (0-10)	1.31	1.27	1 (0-10)
Children ages 5-9	1.33	1.20	1 (0-9)	1.34	1.24	1 (0-8)	1.3	1.2	1 (0-8)	1.40	1.25	1 (0-9)	1.36	1.24	1 (0-9)
Children ages 10-17	2.09	1.59	2 (0-12)	2.10	1.69	2 (0-11)	2.12	1.65	2 (0-12)	2.22	1.66	2 (0-12)	2.21	1.59	2 (0-11)
Pension-eligible adults	0.53	0.70	0 (0-4)	0.50	0.67	0 (0-3)	0.47	0.67	0 (0-4)	0.54	0.69	0 (0-4)	0.49	0.66	0 (0-4)
Working-age adults	4.58	2.56	4 (0-25)	4.70	2.65	4 (0-25)	5.16	2.63	5 (0-25)	5.46	2.57	5 (0-25)	5.33	2.49	5 (1-17)
Household dependency ratio	1.20	0.91	1 (0-9)	1.12	0.82	1 (0-9)	1.03	0.7	1 (0-6)	1.05	0.71	1 (0-9)	1.06	0.70	1 (0-6)
Sum FT-employed adults	1.56	1.42	1 (0-10)	1.57	1.44	1 (0-10)	1.7	1.5	1 (0-10)	2.15	1.62	2 (0-10)	1.88	1.51	2 (0-10)

Notes: Estimates in Table 2.2C are for the n=39,913 members of households who participated in the HSE; percentages are weighted with the propensity score weight.

Table 2.3: Sex composition of migrant populations according to "traditional" and "newer" definitions of migration and mobility

"Traditional" measures	Men		Women		Age-adjusted odd ratios, M:F			Migrant Category		
	N	Row %	N	Row %	OR	99%	CI	M pre-dominant	F pre-dominant	No diff.
Residency status								+		
Non-resident	8,972	55.4	7,221	44.6	1.00					
Resident	11,792	39.9	17,732	60.1	0.56	0.53	0.59			
Present previous night								+		
No	7,656	54.4	6,425	45.6	1.00					
Yes	13,101	41.4	18,520	58.6	0.62	0.59	0.65			
Out-migrated*	2,502	50.3	2,468	49.7	1.43	1.32	1.56	+		
"Newer" measures	**Men**		**Women**		**Age-adjusted odds ratios, M:F**			**Migrant Category**		
	N	**Row %**	**N**	**Row %**	**OR**	**99%**	**CI**	**M pre-dominant**	**F pre-dominant**	**No diff.**
Internally migrated*	474	30.6	1074	69.4	0.59	0.51	0.68		+	
In-migrated**	1,331	49.2	1,373	50.8	0.77	0.69	0.86		+	
Any change of residence †	7,861	47.4	8,719	52.6	1.03	0.98	1.09			+
	Age-adjusted (mean) probabilities ††									
Nights at home, past 6 mo.	**N**	**Mean (SD)**	**N**	**Mean (SD)**						
Every night	6,007	0.27 (0.06)	8,892	0.37 (0.08)						
Most nights	6,302	0.33 (0.01)	8,981	0.34 (0.02)						+
Approximately half	3,052	0.14 (0.02)	2,866	0.12 (0.02)						+
Few or no nights	5,403	0.25 (0.05)	4,214	0.18 (0.04)				+		

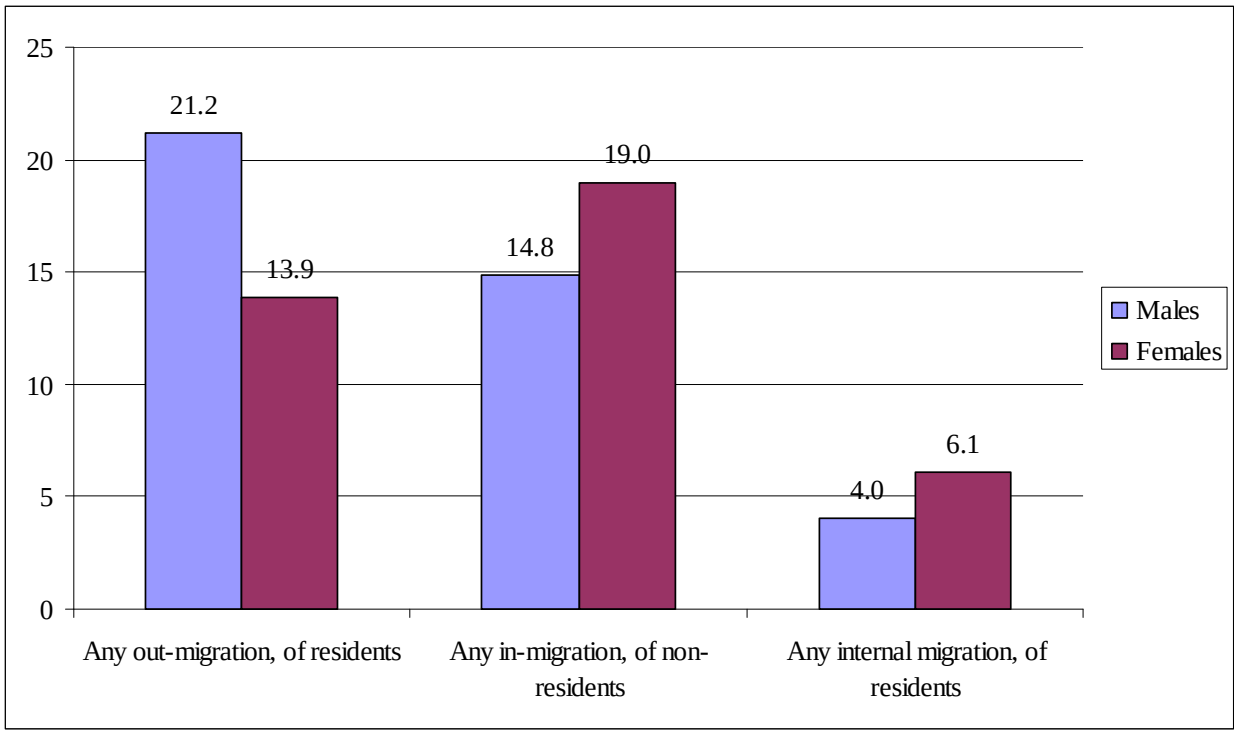
Note: Data shown for total adult population who were members of households on 01 January 2001. Presence on night before visit refers to HSE visit for those who participated in HSE, and refers to most recent visit after 01 January 2001 for those who did not participate in HSE. * Of residents; ** Of non-residents; † Any in-, out- or internal migration in two year period. †† Age-adjusted probabilities of degree of presence in the household in previous six months by sex generated from ordinal logit model estimates. Sex differences in presence pattern (each level) statistically significant at $p<.0001$.

Table 2.4: Household migrations in 2 years following HSE or 01 January 2001, among residents, by sex (row and column percentages)

Household migrations							
	Women	**Men**	**Total**		**Women**	**Men**	**Total**
No internal	17,160	11,472	28,632	No external	17,194	11,411	28,605
	59.9	40.1	100.0		60.1	39.9	100.0
	96.8	97.3	97.0		97.0	96.8	96.9
Any internal	572	320	892	Any external	538	381	919
	64.1	35.9	100.0		58.5	41.5	100.0
	3.2	2.7	3.0		3.0	3.2	3.1
Total	100.0	100.0			100.0	100.0	

Notes: Data are shown for all individuals who were resident members of one household on 01 January 2001.

Figure 2.1: Migration in 2 years following HSE or 01 Jan. 2001, by type and sex



Note: Data refer to individual migrations, of each type, for adult members of households on 01 January 2001, in two years following HSE (for those who participated in HSE) or 01 January 2001 (for those who did not.)

Figure 2.2: Individual migration flows between 01 Jan. 2001 and Jan. 01 2007, adult women who were members of households on 01 Jan. 2001

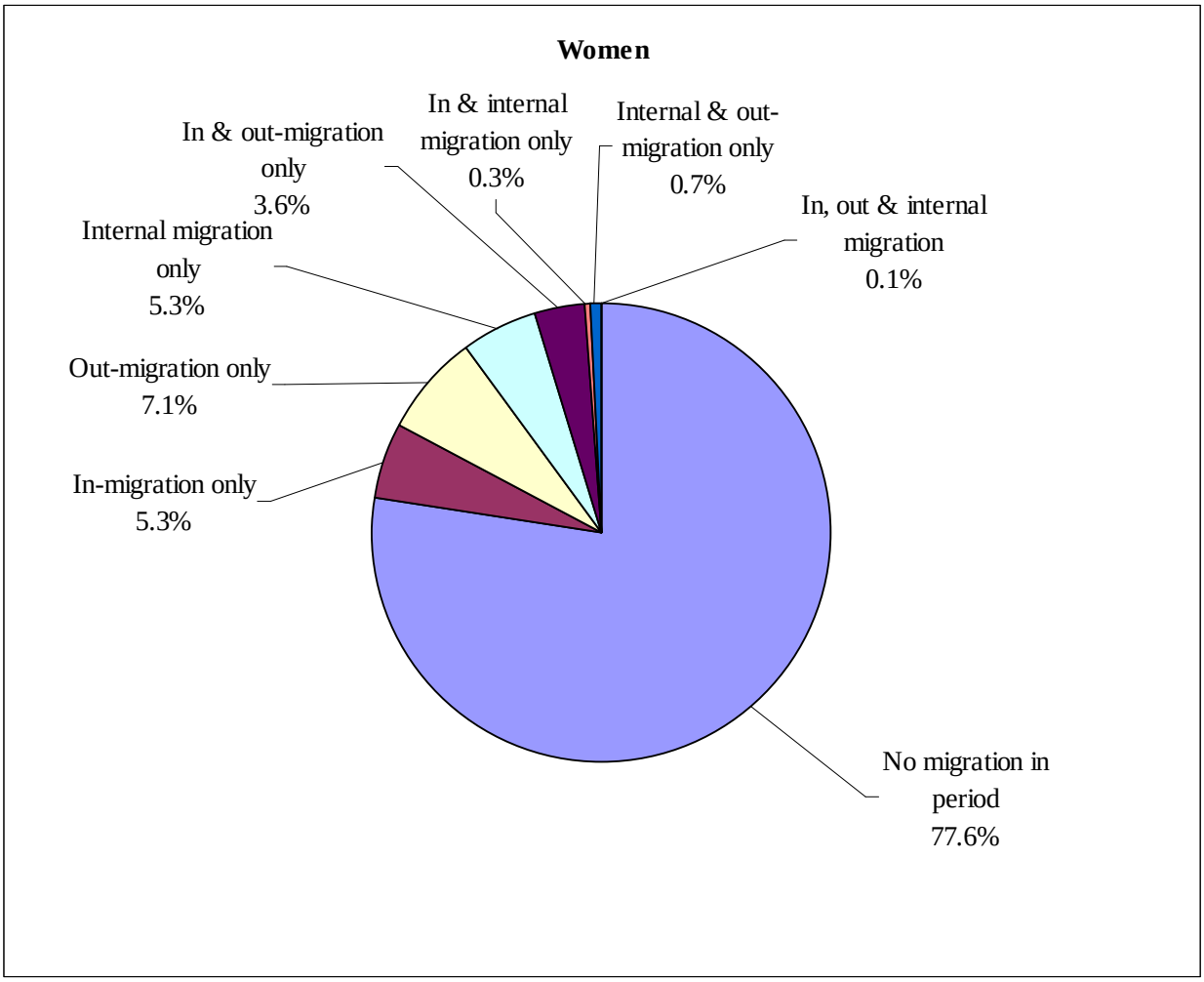


Figure 2.3: Individual migration flows between 01 Jan. 2001 and Jan. 01 2007, adult men who were members of households on 01 Jan. 2001

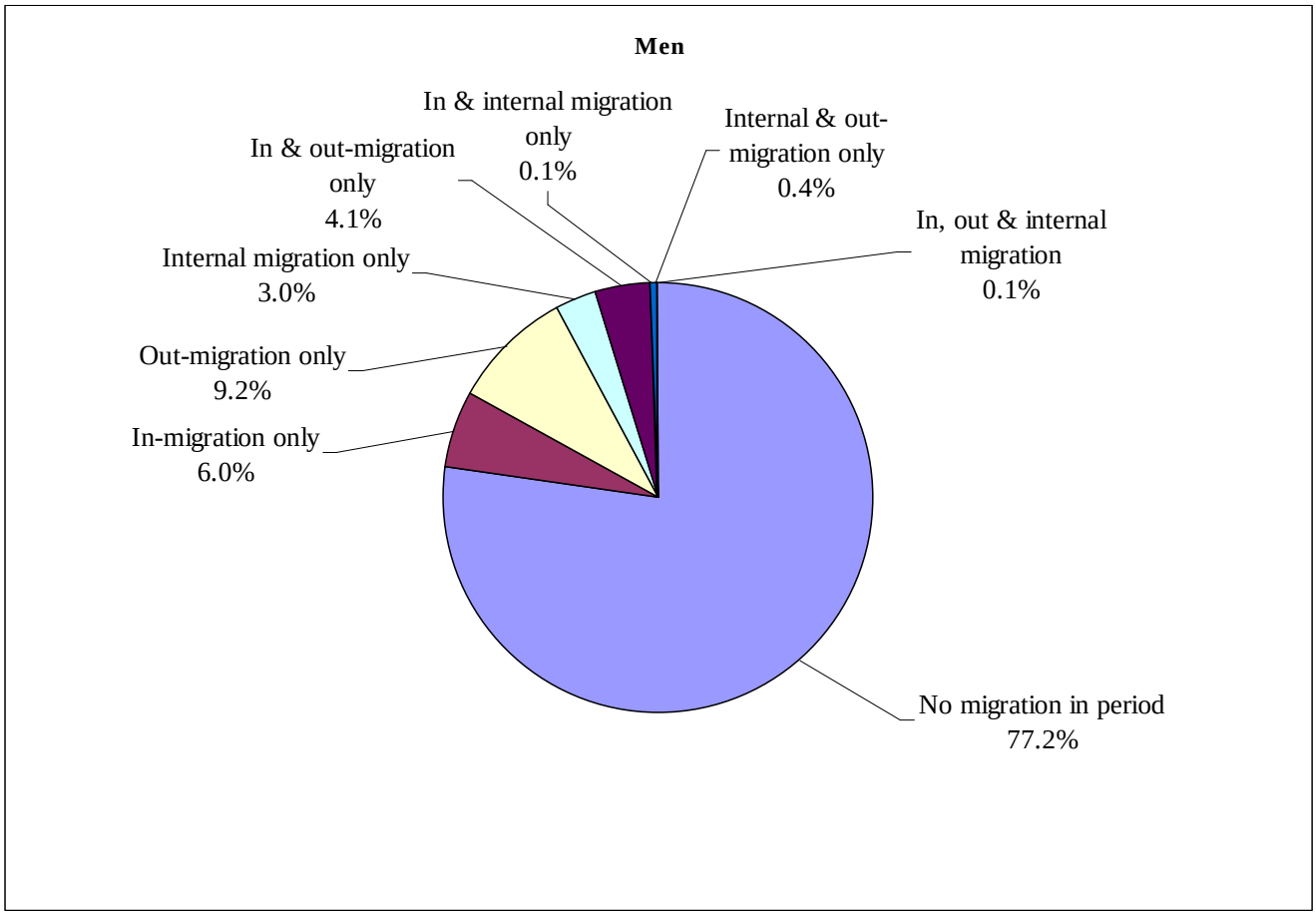


Figure 2.4: Mean number of migrations after HSE 1 visit or 01 January 2001, by type and sex

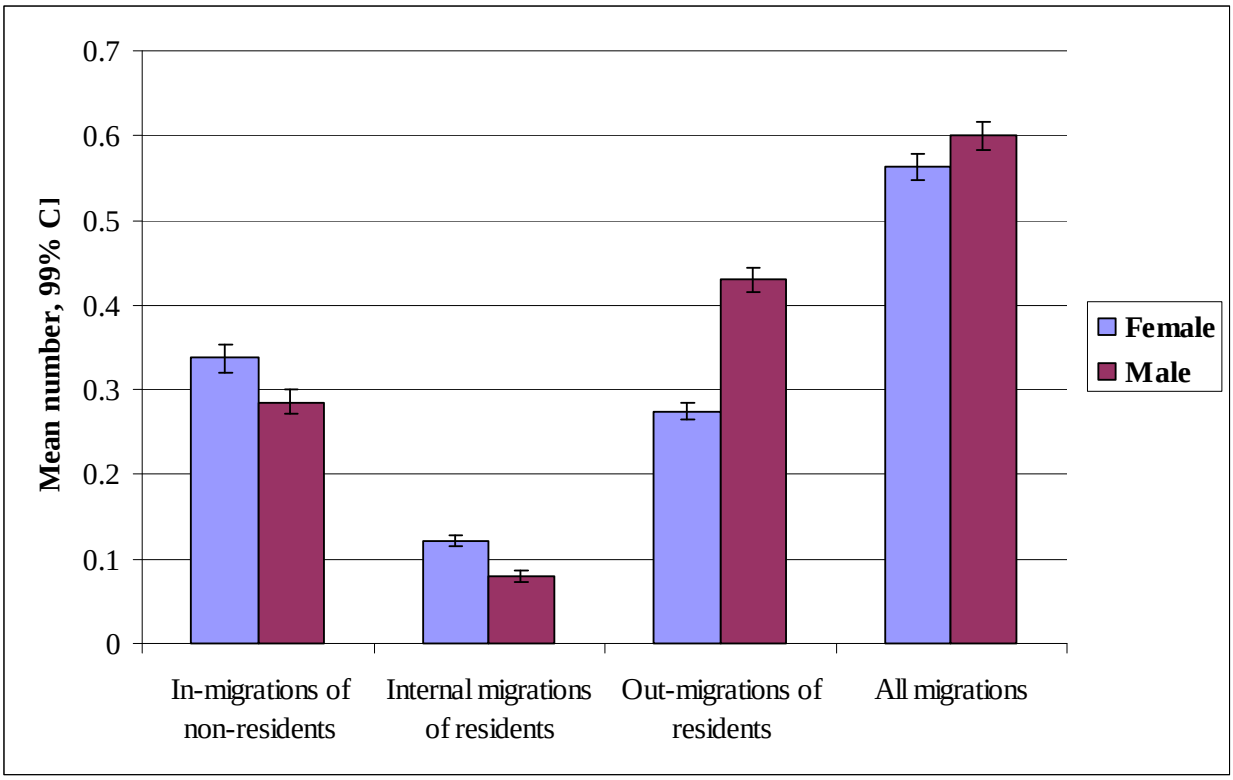


Figure 2.4 shows the results of t-tests of sex differences in mean numbers of migrations by type, assuming unequal variances, and 99% CI.

Appendix Table 2.A: Characteristics of individuals who are members of more than one household and those with only one household membership on 01 January 2001

Characteristic	Households with any multiple members (n=3,118)		Households with no multiple members (n=11,802)	
	N of adults	% of adults	N of adults	% of adults
Adults (Total n=47,669)	**1,952**	**100.0**	**45,717**	**100.0**
Female	1,059	52.4	24,953	54.6
Male	893	45.7	20,764	45.4
Resident on 01 Jan. 2001	1,426	73.0	29,524	64.6
Non-resident on 01 Jan. 2001	526	26.9	16,193	35.4
Households (Total n=14,920)	**Median (Range)**	**Mean (SD)**	**Median (Range)**	**Mean (SD)**
Working-Age Adults	1 (0-8)	1.17 (0.74)	3 (0-25)	3.52 (2.24)
Old-age pension-eligible adults	0 (0-2)	0.13 (0.35)	0 (0-4)	0.35 (0.59)
Children aged 0 to 17	0 (0-16)	0.64 (1.19)	3 (0-24)	3.39 (2.74)
Dependency ratio	0 (0-9)	0.55 (0.95)	1 (0-9)	1.18 (1.01)

Variable notes: Working-age adults defined as sum of females aged 18-59 and males aged 18-64. Old-age pension eligible defined as sum of females aged 60 or older and males aged 65 or older. The dependency ratio is the ratio of dependents (children aged 0 to 17 and pension-eligible adults) to working-age adults.

Notes on Appendix Table 2.A:

Table 2.A shows the characteristics of multiple and singular household members. As shown, women predominated in both types of households, but a slightly higher proportion of the individuals who were members of more than one household were male compared to individuals with one household membership (45.7 vs. 45.4%), reflecting the inclusion of polygamous males in this population. Those with multiple memberships were more likely to have at least one residence in the area on 01 January 2001 (73% vs. 64.6% of the singular members who were resident in the area.) Households with at least one member who had multiple memberships were smaller in aggregate, as they included the separate smaller auxiliary households of individuals with more than one membership. Thus the multiple members' households had a smaller number of members of all age groupings, but especially of dependents per household, leading to a proportionately lower household dependency ratio. The 1,952 adults with multiple memberships were excluded from further analysis in this Chapter.

Notes

[i] In collaboration with the Instituto Nacional de Estadistística, Geographía e Informática of Mexico.

[ii] The Population Registration Act of 1950, which designated the racial category of each person, provided a basis for subsequent laws that racially differentiated urban residence and internal migration rights.(Thompson, 2000, in Anderson, B. (2006). Migration in South Africa in Comparative Perspective. Migration in South and Southern Africa: Dynamics and Determinants. P. Kok, D. Gelderblom, J. O. Oucho and J. van Zyl. Cape Town, South Africa, Human Sciences Research Council**:** 97-117.).

[iii] Hunter's ethnographic research in KZN vividly depicts the flow of work-seekers to the industrial areas that have shedded jobs: in the Isithebe Industrial Estate and surrounding informal settlement area, the population increased by an extraordinary 300-400% between 1996 and 2001, despite job losses: "The large number of unemployed women and men means that every weekday, hundreds of unemployed people move from factory to factory to *fesa* (seek work). Some have done so for more than two years without finding employment."
Hunter, M. (2004). From migrating men to moving women? Historical patterns of women's migration, Migration Working Group, Africa Centre for Health and Population Studies, 25 Nov. 2004., (p.13)

[iv] Dodson and Crush's (2004) report on the 2002 South African immigration policy aimed to demonstrate the ways in which the policy both constructed gendered concepts of 'the migrant' and produced de facto gender discrimination, in part through its rigid definitions of the types of labor for which immigration is permitted to the nation.

[v] These are areas of high social instability, characterized by high density housing, typically one roomed shacks or *imijondolos,* and limited infrastructure such as roads and reticulated water. (Hunter, 2007).

[vi] A much more easily measured shift in the social landscape relative to marriage in South Africa is in the legislative arena, following the 1994 democratic elections. The legal situation in South Africa with respect to marriage, especially for blacks, shifted dramatically with the passage of the Recognition of Customary Marriages Act, Act 12, of 1998. Prior to the passage of this law, relationships formalized according to indigenous rites ("customary marriages") were not recognized under law; after the Act, "customary unions" entered into in the past were to be relabeled as "marriages". The Act provided protections to blacks, and African women in particular, with respect to inheritance, pensions, medical aid, child maintenance, and divorce settlements. The law was largely intended both to legally recognize customary marriages and also to "eliminate by law much of the core of its male-centered rules" (Chambers, 2000), closely following the theme of gender equality enshrined in the Interim and Final Constitutions. According to Chambers, the new constitutions emphasized equality based on sex as strongly as they did equality based on race; this grew out of the African National Congress's adaptation of Western human-rights ideologies "as well as the participation of South African women and women's groups in the anti-apartheid movement and in the negotiations over the constitution."(Chambers, 2000, p. 108). The law had three dominant themes: the first was to ensure that both members gave their consent to marry. The second was to declare men and women equals within the marriage relationship; this meant that women were for the first time given the power to acquire and dispose of assets, enter into contracts, and litigate in their own names. Finally, the state inserted its own bureaucracy into customary law, requiring the registration of marriages with a government agency, and requiring that divorce be permitted only by a family court judge. By this account, practices and substantive changes, for example in marriage registrations and litigations, have been slow to take shape. Yet, the groundwork for dramatic changes in gender norms related to marriage was laid in the establishment of this law in 1998.

[vii] My translation. Original text: *"Contrairement aux migrations de jeunes homes bwa qui s'inscrivent encore très clairement dans une logique collective familiale de diversification des revenues, la pratique migratoire des jeunes filles, plus récente, repond à des exigencies plus individuelles et contourne les procédures traditionnelles. Elle est l'une des expressions des changements en cours qui échappent au contrôle des groupes sociaux de référence et offre une vision des futures rapports sociaux hommes-femmes."*
Lesclingand, M. (2004). "Nouvelles stratégies migratoires des jeunes femmes rurales au Mali: De la valorisation individuelle à une recognition sociale." Sociétés contemporaines **55**: 21-42., p. 38.

[viii] My translation. Original text: '*les besoins, les aspirations, les vulnérabilitiés, les rêves de vie, les rapports avec la famille et la communauté locale sont en interaction pour établir des choix, dont celui de migrer ou non.*'" In: Ibid., p. 24.

[ix] As shown in Appendix Table A, there were 11,802 households in which ALL members were members of only the one household. In that table I present a basic comparison of the characteristics of the 1,952 individuals (in 3,118 households) who were members of more than one household with their counterparts who had singular household memberships on that date. The members of all households in which at least one member had more than one membership were excluded from further analysis elsewhere in this chapter. In other words, not only the multiple household members themselves, but also the individuals with whom they shared household membership, were excluded from further analysis, in order to present valid household-level estimates (for example, of the number of full-time employed adults, or of the number of adult deaths in the household over a period.)

[x] Within the framework of the linear model, one assumes a linear relationship between an exogenous and endogenous variable; and assumes that the endogenous variables is affected additively by a disturbance term characterized by an expected value of zero for each value of the exogenous variable. If these assumptions are met, the error term is uncorrelated with the exogenous variable, which guarantees unbiased least squares estimates of the slope and intercept. When these assumptions are violated, however, causal effects estimated by the regression line may systematically under-estimate or over-estimate the true causal effects.

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Chapter 3

Gender and the Determinants of Migration in South Africa

Introduction. In the previous chapter, I established that in a primarily rural area of KwaZulu-Natal (KZN), South Africa, men and women had similar overall levels of mobility and migration in recent years, if the measures used to 'capture' their mobility and migration reflected the true migration behaviors of both sexes. There were significant sex differences in the types of migration observed in an adult population living in a predominantly rural, 450 square-kilometer demographic surveillance area (DSA): men residing in the DSA were more likely than their female counterparts to move out of the area; women who were members of households within the DSA but residing outside of the area were more likely than their male counterparts to return to it; and of those residing within the DSA, women were more likely than men to make local changes of residence within the DSA, and to do so more frequently (net of the effects of age differences between men and women in the prediction of these migration behaviors). The question remains, do these sex compositional differences in migration types hold true when one accounts for the other factors that differentiate migrants from those who are

more stable, such as marital status, employment status, and the household-level factors that surely contribute to the decision to migrate? The analyses presented in this chapter will address this question. Further, the literature on sex differences in the determinants of migration is quite small, particularly for southern Africa. The analyses presented in this chapter represent my attempt to address this gap. I examine to what extent the factors that predict migration differ for men and women, in a rural area of KZN. I use a range of measures of migration in order to ensure that the determinants of both men's and women's patterns of mobility are fully examined; and this also permits a comparison of the factors that predict different types of migration flows. To my knowledge, this study is the first to examine sex differences in the determinants of internal migration, by type of internal migration flow, in a sub-Saharan African population.

The forces driving the migration of men and women in South Africa today are likely to be numerous and diverse. South Africa's specific history, including the migrant labor system put into place under colonial regimes and apartheid-era governments, the forced displacements of African communities, and laws governing movement and settlement patterns all influenced South African men's and women's patterns of mobility in quite direct ways, with consequences for their patterns of mobility in the contemporary, post-1994 era. Transformations in the sex composition of the labor force, and in marriage and household composition, appear to have involved women in labor migration in greater numbers than seen before in South Africa, while men's levels of labor migration – changes of residence in order to seek work, if not always to find it – appear to have persisted despite continued high levels of unemployment in the nation. The labor migration of selected household members appears to have remained a key component of

the livelihood strategies of rural households. The AIDS epidemic has wrought its own influence on the mobility of individuals and households in South Africa, as people living with HIV/AIDS return home to be cared for when ill, or change residences in order to live near to the health services they need; households dissolve, and new living arrangements for children and adults are sought following the catastrophe of death of a family member. This diverse range of factors complicates any effort to investigate 'why do women and men migrate?' on the basis of general theories of migration. This chapter begins with a review of the literature on the specific socio-political, economic and epidemiological forces involved in driving South Africa's high levels of mobility, and provides a summary of the small body of research on the sex-specific factors that appear to influence men's and women's migration in South Africa today. In particular, I review the scholarship on gender-related determinants that help to account for the sex-specific patterns of migration described in the previous chapter. In the second part of this chapter, I present empirical research on sex differences in the determinants of migration in the population residing in the Africa Centre's DSA in Unkhanyakude District, KZN.

Changes in the migrant labor system in South Africa. To understand South Africa's 20th century migrant labor system it is helpful to consider its earlier history: South Africa is perhaps the most extreme example of modern overseas settlement colonization (Osterhammel 1997)[i] This form of colonialism occurs when "a politically dominant settler minority—usually with the help of the colonial state—expels an indigenous peasant population from the best land, but remains dependent on the labor of that same population and finds itself in sustained competition with it for parts of the remaining land" (ibid., p.7). In South Africa the system of domination was particularly

racialized. The particular economic dependence South Africa's white settlers had on the African indigenous population explains the instability of this type of colonialism— and the extremist ideologies that emerged from it. From its beginning through the end of apartheid, South Africa's governmental policies were driven by a central concern: obtaining the cheap labor of blacks in order to support the privileged economic position of whites (Feinstein 2005). The colony was characterized by abundant land and scarce labor; yet rather than to permit market forces to generate supply, the labor force was obtained through coercion: even prior to apartheid, the government enacted a century or more of laws and statutes to disenfranchise blacks, dispossess them of lands, and enforce their labor in white-owned farms, mines and other businesses (ibid.).

According to Feinstein, the paradox of scarce labor and low wages, and the under-development of a national market for goods due to under-investments in education for blacks, resulted in a "chronic disease" in the South African economy; economic collapse was inevitable: "By the 1970s […] the central problem was no longer the inability of employers to find workers, it was the inability of workers to find jobs." (Feinstein 2005)(p.237). The economic crisis fully erupted in the 1980s, working in tandem with growing international and domestic campaigns against apartheid to bring about the regime's demise. Yet the economic trends set into motion over decades have not found simple resolution despite political changes: levels of unemployment in South Africa today represent "a human tragedy on a staggering scale" (Feinstein 2005)(p. 238). Between 1980 and 1996, the potential labor force, according to census data, increased by almost 4.5 million; and almost all of these (4.17 million) became unemployed (ibid.). If

'ultra-discouraged workers' are taken into account, some 6.3 million South Africans, the majority of whom were black, were unable to find work in 1996.[ii]

The sex composition of the labor force dramatically shifted as unemployment rose in South Africa over the 1990s: for males, the participation rate dropped from 97% in 1960 to 65% in 1996; for females it rose in the same period from 30 to 49% (Feinstein 2005): women now comprise approximately half of the South African labor force, and this is a recent phenomenon. Yet, there is little evidence that the feminization of the labor force is associated with women's increased mobility in the labor market (Casale and Posel 2002). The biggest changes seen for women over the 1990s were in increased unemployment and in self-employment in the informal sector, marked by low-paying survivalist activities in (such as beer-brewing, sewing and informal selling) (ibid.).

A feminization of internal labor migration. The economic crisis of the 1980s in South Africa produced unemployment, and may have influenced a shift in the sex composition of the labor force. It did not, however, result in an ebbing of internal migration rates in South Africa. One study of internal labor migration using three sets of national population-based survey data indicated that over the 1990s, there was overall little change in the population of African adults reported as migrant workers (defined as "someone who is absent from home for more than a month each year to work or to seek work" and "working or looking for work away from what they call 'home'")(Posel and Casale 2003)(p. 458); some 10% of all African adults were reported to be migrant workers over the years surveyed.

Over the same period, however, the sex composition of the population of internal labor migrants shifted, in parallel with the shift in the sex composition in the labor force:

the percentage migrant among African males dropped from 15.5% in 1993 to 10.4% in 1999; while among females the percentage migrant increased from 5.7% to 6.5% over the period. A modest increase in internal migration was found among African rural adults over the period (from 13.7% to 14.4%), an increase due to a rise in the proportion of rural African females in labor migration, from 7.4% to 8.9%. Overall, the percentage of African migrant workers who are female increased from 29.7% to 33.7%, and who are male decreased from 70.4% to 66.3%.

Posel (Posel 2004; Posel 2006) and Anderson (Anderson 2006) have commented that the continuance of South Africa's high levels of temporary labor migration (in which the migrant does not move away permanently, but returns periodically to the household of origin) after the dismantling of apartheid ran counter to the expectations of government policy makers and planners. In the 'new South Africa', it was thought, people would choose not to be labor migrants but would rather migrate to, and settle permanently, in places where they worked. However, the lifting of Influx Control, urban residency and land ownership restrictions all contributed to sustained high levels of temporary migration rates in the 1990s (Posel 2004); and rising unemployment may have suppressed large-scale permanent migration to urban areas.

Determinants of the feminization of the labor force. Women's increased labor force participation has been attributed to economic pressures resulting from declining male participation (Feinstein 2005), as well as to their increasing levels of education, declining marriage rates and a decline in the proportion of women living with at least one man of working age, the latter two changes being "suggestive of a fall in women's traditional forms of income support within the household" (Casale and Posel

2002)(p.191). Similarly, Hunter has argued that declining marriage rates in South Africa (as well as a broader transformations in 'masculinities') are a consequence of male unemployment in South Africa; he has posited that women's increasing mobility is linked to the ever-decreasing likelihood of receiving the income support of a husband (Hunter 2006).

Empirical data do suggest that the proportion of African households economically supported by the income of a male household head has decreased in recent years One study using national population-based survey data showed that the percentage of women living with at least one man of working age fell from 83% in 1995 to 77% in 1999 (Casale and Posel 2002); concomitantly, the percentage of household heads that were female increased: in 1999, 37% of all African households were headed by females (ibid.) Reports of declines in marriage in South Africa were until recently largely anecdotal, as reliable nationally-representative population-based estimates were lacking, and issues in the measurement of nuptiality in South Africa were complicated both by changes in laws and varied cultural practices related to marriage (Budlender, Chobokoane et al. 2005). These weaknesses notwithstanding, Posel's analysis of October Survey data showed that the national percentage of black women currently married declined from 34.6 percent in 1993 to 30.1 percent in 1999. Udjo's comparison of 1970 and 1996 census data provided no national aggregated marital status estimates, but noted that in KwaZulu-Natal, the percentages of those over age 50 reporting they had never been married or were living in a non-marital co-habiting relationship had risen from 14 to 27 percent of men, and from 5 to 18 percent of women between the two census periods (Udjo 2001). A recent analysis of demographic surveillance data from a predominantly rural area of the province showed

a continuous decline in marriage, and increase in the proportion never married, between 2000 and 2006; by 2006 a full 69 percent of women had never been married (Hosegood, McGrath et al. 2008).

Determinants of the feminization of migration. While marital status is likely to remain an important individual-level predictor of migration, migration for marriage may have declined in salience as a macro-level driver of women's migration in South Africa, and evidence points to the influence of women's increasing participation in the labor force on increasing levels of female internal migration. Yet, women's mobility in the labor market remains limited. This fact, and more broadly, that high levels of temporary labor migration have persisted in South Africa despite increasing unemployment, in some respects contradict the precepts of neo-classical economics (e.g. (Todaro 1976) as applied to studies of migration. These precepts mirror the common-sense notion that people leave their areas of origin (countries, states, villages) because these areas are poor, underdeveloped, and consequently lack economic opportunity, and migrate for permanent settlement in wealthier, more developed areas, seeking wider opportunities for employment at higher wages. We assume in other words that unequal development creates a true market demand for labor, driving migration. Massey (Massey, Arango et al. 1998; Massey 2006) however, has posited that an alternative theory, the 'new economics of labour migration' (Stark 1991) better fits the reality for South Africa and other developing countries undergoing structural transformation. Following this theory, migration is undertaken not (or not only) to optimize household income, but as a form of risk insurance against insecure markets. Where urban labour markets are volatile,

as in South Africa, a geographically stretched household- one in which members live and work in multiple places- diversifies its risks.

Empirical data from South Africa supports this proposition in many respects: South African households are extraordinarily geographic stretched, as members are sent to seek employment, whether it be in formal or informal sectors, yet retain a meaningful connection to their rural household of origin. Data from a demographic surveillance site in KwaZulu-Natal show that migrants constituted a full 35% of the total household population, and 41% of adult and 29% of child members were not co-resident with their rural household (Hosegood and Timaeus 2005). The remittance income from labor migrant household members is an essential to the livelihood strategy of poorer, rural households (Posel 2001), and remittances as a proportion of total household expenditures may have increased over the 1990s (Posel 2006) . Moreover, the large social transfers in South Africa, enacting since the democratic elections of 1994, rather than suppressing labor migration, appear to play in important role in facilitating it. The provision of old age pensions and child care grants enable households-- particularly poorer ones-- to overcome the financial and childcare constraints to sending a migrant (Ardington, Case et al. 2007).

As predicted by the 'new economics of labour migration', South African households are clearly diversifying their risks and labor portfolios. Yet, they are doing so in a distinctly gendered manner, with potentially important implications for the sex patterns of migration. The scholarship on pensions and remittances in South Africa suggests that the sex of a household pensioner may affect the sex of the migrant a household sends: the presence of a woman pensioner promotes the labor migration of

both male and female household members, consistent with female pensioners pooling their income with prime-aged members of both sexes. The presence of a male pensioner, however, appears to promote the labor migration of prime-aged male household members only (Ibid.). This finding is supported by other research showing that a greater percentage of rural women who migrate for work come from households with at least one woman who is of pension age (41% compared to 25% in households without a female pensioner); in households with a male pensioner, there was no significant difference in the percentages of female migrants and other rural women (Posel 2001); indeed, the probability of female migration rose as the number of female pensioners in the household increased (Ibid.) A *gogo* (grandmother) in the household provides not only for access to the pension income that keeps many households afloat (Ardington and Lund 1995; Case and Ardington 2004; Ardington, Case et al. 2007), but grannies and other extended family members often also provide the child care that permits women to work or seek work (Case and Ardington 2004; Hunter 2004; Ardington, Case et al. 2007). In sum, the body of research on sex differences in determinants of migration is small, but findings suggest that the presence of older women in rural households, and absence of older men and husbands, may play a role in facilitating the migration of working-age women in South Africa.

The participation of women in labor migration, moreover, reflects the changing composition of poorer, rural households. Whereas South African rural households were traditionally conjugal, they are increasingly characterized by a more flexible, kinship-based structure: most are multi-generational (Hosegood and Timaeus 2001), and dependent on income from old age pensions, child grants and migrant remittances (Case

and Ardington 2004). These households clearly benefit from having a member who is a labor migrant: they households have a higher socio-economic status than those who do not (Collinson, Tollman et al. 2003; Kahn, Collinson et al. 2003). Households who send a female migrant may, moreover, derive a greater benefit than those who send a male, despite migrant women's lower likelihood of formal sector employment and lower incomes relative to male migrants (Casale and Posel 2002) (Posel 2001; Duflo 2003). Female migrants are more likely to remit income (Collinson, Tollman et al. 2003), and remittances from male migrants are lower than those of females in South Africa (Posel 2001; Collinson, Tollman et al. 2003; Tienda, Findley et al. 2006) and elsewhere (Bilsborrow 1992). Further, the labor migration of mothers appears to result in modest improvements in the health status of their children, through the improved nutrition and access to health care afforded by additional household income they provide (Kahn, Collinson et al. 2003).[iii]

Scholarship on the individual–level determinants of migration in South Africa confirm what is seen globally in studies of migration: socio-economic position (measured, for example, by education level, employment status or income) is associated with the decision to migrate: young people move to obtain a better education, and, for young women, especially, "to experience life with more autonomy than is possible in the conservative patriarchy of the rural areas" (Kahn, Collinson et al. 2003)(p.14). They move to seek employment, to escape from poverty and to provide financial support to the families they leave behind (ibid)(van der Berg, Burger et al. 2002; Posel and Casale 2003). Specific findings related to the effects of education level on labor migration in South Africa have revealed complex sex differences: there are consistent findings that

education level is associated with women's migration, broadly (van der Berg, Burger et al. 2002; Posel 2004). But among men, one study showed that those with the highest level of education were more likely to stay in rural areas, where their employment prospects were as good as in urban areas (van der Berg, Burger et al. 2002). Unemployed males tended to not be competitive in either rural or urban labor markets, yet they were found to be continuing to migrate out of rural areas in search of employment (ibid.) For women, education played a weaker role in their employment probabilities: both urban and rural environments favored women with more education (ibid.).

Marital status and gender interact in the prediction of migration throughout sub-Saharan Africa, where patrilocal marriage systems traditionally have involved female migration for the purpose of joining a husband's household. In some areas this appears to continue to be salient for the study of female migration, despite declining marriage rates across the region: a recent longitudinal study in Tanzania found that 25% of female migrants left their households of origin because of marriage (Boerma, Urassa et al. 2002). A recent study from Zimbabwe found that women were more likely than men to migrate for marriage, but this varied by migration destination: 63.5% of female migrants to rural areas and 28.3% of those to urban areas moved for the purpose of marriage (Coffee, Garnett et al. 2005). A study from a demographic site in Limpopo Province in South Africa found that women's migration was associated with their changes in marital status (Collinson, Tollman et al. 2003). To date, no studies in KwaZulu-Natal have examined the extent to which women move for purposes of marriage. The empirical research reviewed earlier tends to support the proposition that conservative social norms related to gender may suppress the migration of women; thus, marriage would be likely to suppress

female migration, not only because males, with greater power to independently choose to migrate, may favor choosing themselves as migrants for their own benefit (Posel 2001; Posel 2006) but also because the income supports of a male household head may obviate the need for women to migrate.

The effect of HIV/AIDS on mobility of individuals and households. A growing body of literature has documented the effects of AIDS mortality on the mobility and living arrangements of surviving family members (Urassa, Boerma et al. 2001; Hosegood, McGrath et al. 2004; Ford and Hosegood 2005; Hosegood and Timaeus 2005; Hosegood, Floyd et al. 2007). The death of an adult member of the household often results in dissolution of the household (Urassa, Boerma et al. 2001; Hosegood, McGrath et al. 2004), particularly for poorer households and those coping with the death of more than one adult (Hosegood and Timaeus 2005; Hosegood, Preston-Whyte et al. 2007). A previous study in the ACDIS population found that households where one or more adult members died during the follow-up period were four times more likely to dissolve, after controlling for household and community level risk factors (Hosegood, McGrath et al. 2004). Studies of the impact of adult AIDS mortality have often focused on children. Ford and Hosegood (2005) note that while the migration of children following the death of a parent can be seen as "usually an attempt to enhance the well-being of a child," and "the strategy of short- to long-term fostering of children in rural South Africa is a well-established social system with many advantages for ensuring the care and support of children" (p. 766), there is likely to be a difference in what has been termed "crisis fostering" and those for whom a move has been a positive choice (Ibid.). In their study, children whose mothers died of another cause than AIDS were more likely to migrate

than those whose mothers died of AIDS; this was seen to be due to "the lack of time to arrange alternative care for children prior to the death of the parent or to a more general socially unstable environment arising from unexpected or violent deaths." (p. 765). While in Umkhanyakude in 2004, almost half of non-orphans live in a household headed by their grandparents, and only 27% were living with both parents (Hosegood, Floyd et al. 2007), those grandparents are coping with an increasing burden of young adult deaths, the majority of which were attributable to AIDS, and the fostering of an increasing number of orphans (Hosegood and Timaeus 2005). Recent qualitative research in the area (Hosegood, Preston-Whyte et al. 2007) has described the impact on households of multiple episodes of HIV-related illness and AIDS deaths among household members. While over 50% of all adult deaths are due to AIDS, households continue to face other causes of illness and death; these other causes compound the impact of AIDS, particularly where the deceased was the main income earner and/or primary care-giver for young children. Further, the illness and death of non-household members, for example, former partners who are parents of children within the households or relatives who provide financial support, also impact negatively on households (Ibid.). The studies reviewed here have primarily examined the impact of AIDS on households as a unit, or on children as the unit of analysis, and fewer have examined the impact of adult deaths in the household on the individual migration behavior of surviving adult household members. The research would suggest that the deaths of adults in the household, whether due to AIDS or another cause, may stimulate the migration of other adult household members for a variety of reasons: to move in to another household in order to take over the role of care-giver of children, or to move out of the area in order to find work and

provide income to a household when an income-earner has been lost. Further, AIDS-related illness among adults in a household would be likely to induce those who are ill to return home to receive care, and to induce others to return home to care for those who are ill.

Summary. The empirical studies reviewed here suggest that a range of factors may be involved in facilitating or suppressing the migration of men in women in South Africa today. The AIDS epidemic, coupled with high non-AIDS mortality, contributes to the instability of households and precipitates the migration of adults and children. The extent to which men and women differ in their migration behaviors as a result of the death of another household member is less well-documented. Household composition, specifically related to the presence or absence of a male employed household member, and presence or absence of pension-eligible adults (by sex), marital status, as well as characteristics related to socio-economic position such as education level, employment status and income, appear to play a role in influencing the migration behavior of women. What is less clear and consistent across the various studies is the extent to which these factors differ in their influence upon the migration behaviors of men and women.

The literature and empirical research findings described in the previous chapter suggest that the measures of migration used in many studies may be reflect only a small part of female mobility, and more suitable for characterizing male migration. The more nuanced measures used in this study from a demographic surveillance system, including measures of in-, out- and internal migration and household presence pattern within a local predominantly rural area, erase the apparent predominance of males in migration, but reveal distinct sex differences in the patterns and types of migration. These findings, that

the types and patterns of migration differ for men and women, have important implications for the research on the determinants of migration in southern Africa. Would these determinants of migration vary by sex in the same ways for all types of migration, or are certain measures more useful for the study of migration determinants for men or for women? The remainder of this chapter undertakes to explore these questions.

Hypotheses. In this study I test a number of hypotheses related to the impact of various socio-economic and demographic factors on the migration behaviors of men and women. I evaluate first, (1) whether the age-adjusted sex differences in various patterns of migration and mobility, described in the previous chapter, remain after controlling for additional factors likely to predict migration. Secondly, I evaluate the effects of (2) individual characteristics including partnership status, employment status, education level, and parental co-membership with a child in the household; (3) the effects of household socio-economic characteristics including infrastructure (access to clean drinking water, electricity and sanitation) and assets; and (4) household compositional characteristics including the death of an adult household member, the sex and number of pension-age-eligible adults in the household, and the ratio of the number dependents (children under age 18 and pension-eligible adults) to working-age adults in the household, on the individual migration behaviors of the total population and in women and men, respectively.

While there are many gaps in the extant research, I hypothesize on the basis of the literature that being currently employed would suppress the migration behavior of men and women, but particularly of men; and that being married may more markedly suppress the migration of women. I hypothesize that being a co-member of a household in which

one has a child would suppress internal migration and out-migration, but may facilitate the in-migration ('return to the DSA') of those who are non-resident, particularly women. I hypothesize that, generally, individuals from households with poorer infrastructure would be more likely to migrate, perhaps both as a strategy to assist with household livelihood and also to seek better housing conditions; those who are already non-resident would similarly be less like to return to those households, for related reasons. At the same time, the poorest households may not have the resources necessary to send a migrant. Similarly, individuals from households with a higher household dependency ratio, that is with a higher number of dependents relative to the number of working-age adults, may constrain the migration of women, if in these contexts women would be more likely to be relied upon to provide child or elder care; yet, a higher dependency ratio would also mark a greater need for the supportive income of working-age adults, and could thus facilitate migration. On the basis on the prior research, I hypothesize that a pensioner in the household may reduce the childcare restraints on women's out-migration, and reduce the likelihood of female in-migration, particularly if the pensioner is female (as the more conservative social norms expected when a male elder resides in the home would tend to suppress female migration). Finally, I expect that an adult death in the household would tend to precipitate migrations, of all types, and for men and women equally. These hypotheses are tested in the total adult population and sub-populations of men and women who were members of one household on 01 January 2001 in the Africa Centre's DSA within Umkhanyakude District in KZN.

Methods. ***Dataset development.*** The decisions and methods used in the development of the dataset for this analysis are the same as those described in the

previous chapter, and that description is not repeated here. There are, however, additional variables created for this analysis, and additional statistical methods are used; this section describes these additions. These analyses presented in this chapter focus are restricted to the adults aged 18 and older who were members of one household on 01 January 2001 who participated in the first round a Household Socio-Economic Survey (HSE) beginning in 2001; the data were collected for each individual between February 1 and September 20, 2001. Again this dataset excluded the individuals whose households had at least one member who also was a member of another household (some 4% o f the total adult population). The household membership information most recent to (preceding, or on the day of) the collection of household socio-economic data was used for each individual. The dataset included only the migration events which occurred *after* the collection of the first round of HSE data for each individual and up to December 31, 2006, to ensure a logical temporal order in logistic regression models of the determinants of migration events: the data for defining independent variables in all models (socio-economic and other characteristics), are valid for a time period preceding the dependent variables (migration events).

As described in Chapter 2, I adjust for selection bias due to systematic differences in the populations that did and did not participate in the HSE, using a propensity score weight. This is applied to the data displayed in all of the tables presented in this chapter. As the procedure used to develop that weight is described in the previous chapter, that description is not repeated here.

Variables. My approach in this chapter is first to define the distribution of various characteristics that I hypothesize to predict migration various events. As in the

previous chapter, I use three main migration measures, corresponding to three types of residency changes in ACDIS: individual in-migration, internal migration and out-migration. I use dichotomous measures of 1) any in-migration of non-residents within two years after the HSE visit date; 2) any out-migration of residents in the period, and 3) any internal migration of residents in the period for the description of the population characteristics by migration type, and for univariate and multiple logistic regression models of the factors predicting migration.

For ordered logit models of the determinants of shorter-term mobility, I again use a categorical measure of the degree of presence in the household in the previous four months. But in this chapter, this measure refers to the degree of presence in the household in the six months prior to the visit which occurs nearest in time to, but *subsequent* to, the HSE 1 visit. For this variable, I assume a cumulative probability of five levels of presence in the household in the past six months: in the household every night nights in the period), present most nights, present approximately half, present few nights or present in the household no nights in the previous four months prior to the visit to the household.

Table 3.1 shows detailed versions of the characteristics hypothesized to predict migration events in the population. Certain variables were further collapsed following examination of their distributions by migration type. An age group variable combined four eight-year groupings plus a '50 and older' category; the latter is largest in definition but smallest in actual size as a proportion of the total population. Marital or partnership status was defined as in a marital partnership, in a non-marital, regular partnership, in a casual partnership, and non-partnered; multiple logistic and survival models use a

collapsed three-category version: marital partner vs. no partner vs. non-marital partner. Employment status was defined as unemployed vs. in full or part-time employment (the percentage part-time was quite small); and a detailed education level variable is shown in Table 3.1. In the full models this variable was collapsed to four categories: no education through Standard 5 (Grade 7), Standard 6 to 9 (Grade 8 through 11), Standard 10 (12^{th} Grade or Matric, equivalent to High School diploma) or higher, or Full-time student. Table 3.1 shows two measures of parenthood: whether the individual is a father/mother, and whether the individual is a co-member of the household in which their children reside. Values for the latter variable more clearly varied with migration behaviors, so it was chosen for the full models. As mentioned in the previous chapter, a relatively small proportion of children live with both parents in this population, and it is very common for them to live with grandparents or other relatives. This dataset restricted the households of multiple members, and defines the parental co-memberships as either mother or father in this adult population shared the same household with at least one of their children on the day of 01 January 2001.

I use several measures of household conditions: whether the household had access to piped public or private drinking water, whether it had sanitation facilities, and whether it had access to grid or generator electricity. The number of household assets, from 0 to 17, was divided into tertiles. These assets included items such as a bicycle, car, electric stove with oven, electric hot plate, refrigerator, gas cooker, sewing machine, radio/stereo, television set, hoe/spade or garden fork, washing machine, and electric heater. Very few residents in the area can be described as wealthy by South African standards; rather, this is an area characterized by relative levels of poverty. The three quantiles of assets, from

0 to 2, 3 to 6, and 7 to 17, are a very approximate measure of relative household socio-economic status in this context.

To be eligible for an old-age pension in South Africa, females must be aged 60 or older and males aged 65 or older. For a variable of presence of a pensioner in the household, I used a three-level categorical measure: no old age pension-eligible adult, one or more males or at least one male or female pensioner, or one or more females only. Few household members were living with only a pension-age- eligible male, and most households with a male pensioner also had a female pensioner present, so this grouping adequately matched the population distribution of pensioners by sex. Finally, a measure was used to denote whether an individual lived in (1) a household in which no other adult member died within the period (two years for logit models, and three for hazard models), (2) a household in which at least one other adult in the household died before the index individual's first migration event in the period, or (3) a household in which at least one other adult died, but either the death(s) did not precede the index individual's first migration event, or, the other adult(s) died but the index individual did not migrate in the period. Three versions of measure were constructed, to correspond to the first internal, in-migration or out-migration in the two-year period.

***Statistical analysis*.** A set of analytical procedures were used to characterize sex differences in the predictors of various migration events, in order to make maximum use of the available data to test the hypotheses of interest. I test the hypotheses of interest in the total adult population and in the sub-populations of men and women separately, with each procedure used. For the basic logit model, the logistic transformation of the success probability p is given by

$$\text{logit}\ (p_i) = \log\ (p_i / 1 - p_i).$$

Logit (p_i) equals x_i'β, where β denotes the (K+1) x 1 vector of regression coefficients to be estimated (Powers and Xie 2000). Table 3.1 in this chapter shows the unadjusted odds ratios from univariate logistic regression models of each of the independent variables on each of the dependent variables. The selection of final variables for multiple logistic regression and hazard models was informed by both the hypotheses and by the level of significance of the associations seen in the univariate models. In some cases, therefore, variables were included in the multiple logistic regression and hazard models because of their hypothesized importance on the basis of the prior research, even though their bivariate associations with migration in this analysis were non-significant.

An ordered logit model, also known as the 'proportional odds model', was used to estimate the predictors of a four-category dependent variable that measured the level of recent presence in the home, for the total population and in men and women (Table 3.8). The cumulative probability from the ordered logit model is written as

$$C\textit{i,j} = \Pr\ (y_i \leq j \mid x_i) = \exp\ (\alpha_j = x'_i\ \beta) / 1 + \exp\ (\alpha_j = x'_i\ \beta).$$

The ordered logit model assumes proportionality: the effects of x are invariant with respect to each outcome (dependent variable category) (Ibid.) The assumptions of ordered logit models are often not met, and a Brant test of the parallel regression assumption for the models presented in Table 3.8 showed that that this assumption was violated. As a result, I also tested the same hypotheses using the 'generalized ordered logit' model

('glogit' in Stata) (Kang Fu 1997), which can be interpreted similarly to ordered logit, although it relaxes the proportional odds constraint. The 'glogit' model can be written as

$$P(Y_i>j)= \exp(\alpha_j + X_i\beta_j)/1+[\exp(\alpha_j + X_i\beta_j)], \text{ j=1,2,… M-1.}$$

(Ibid.) The ordered logit cut points equal the negatives of the alphas in the above equation. Results of the 'glogit' models indicated that substantively, the violations of proportionality were not important. Therefore, because the 'glogit' model generates many more parameters than does 'ologit' and is thus more cumbersome to interpret, I have presented the ordered logit results in this chapter. Finally, an adjustment for clustering was made to the logistic regression, owing to the use of household-level explanatory variables, and the clustering of individuals within households. This produced robust standard errors (and more conservative confidence intervals) for all of the models. The significance level for all tests was set to 95% confidence.

Results

Population characteristics and their bivariate associations with migration.

Tables 3.1 through 3.3 show the population characteristics and their distribution within migrant and non-migrant categories for each of the three main types of migration. Frequencies for each category within the variables are shown, and for the sake of parsimony in the table, the percentage of migrants only (and not the percentage of non-migrants) within each category. Unadjusted odds ratios and 95% confidence intervals from simple logistic regression models of migration type on the explanatory variable are also shown. Excluded categories for the regression models are italicized. Beginning with

Table 3.1, among residents, a greater percentage of females than males (5.9 vs. 3.9%) made at least one internal migration within two years after the HSE. The largest age group among internal migrants was not the youngest but the 23 to 28 year group (7.6%); but their odds of migration were not statistically significantly different from those aged 22 and younger. Those with a marital partner were quite unlikely to internally migrate: only 1.8% did so, while 7.2% of those with a regular, non-marital partner internally migrated. The odds of internal migration for those who were employed were not statistically significantly different from those who were unemployed, though the percentage of migrants in the latter group was somewhat higher.

The education level of an individual significantly predicted migration, but there was little variation in the levels of migration for those with more than the minimal years of schooling; those with less than a Standard 6 level of education were much less likely than those with a higher level of schooling to internally migrate. This could mark an age cohort effect (the effects of education net of age and other covariates are shown in subsequent tables). Those who were not a parent, and were not a parent sharing the same household as their child, were more likely than parents to migrate, although only for the latter variable was that relationship statistically significant.

Moving to the household-level variables, we see that overall, one's better household conditions were associated with a lower odds of internal migration. Yet the lower the number of household assets, the higher a percentage of migrants, and the negative association between number of assets and the odds of migration was highly significant. Households with a male pensioner, or at least of each sex in the household, were less likely to send an internal migrant than those with no pensioner; those with one

or more female pension-age-eligible adults appeared to be more likely to send a migrant; but this relationship was only marginally significant. Finally, the death of another adult in the household was a powerful predictor of internal migration. While 4.8% of those who experienced no death in the two-year period internally migrated, 56.5% of those who experienced a death in the period migrated after that death, and also within the period. Some 4.4% of those experienced an adult death in the period, but the death occurred after their migration, or they did not migrate in the period; the odds of migration for this group were not statistically significantly different from those of group who did not experience an adult death.

As shown in Table 3.2, the profile of residents who out-migrated is quite different, beginning with their sex composition: the majority of out-migrants were male (22% of males vs. 13.6% of female residents out-migrated). The largest age group among out-migrants was the youngest, 33.5% of whom out-migrated. Being married again suppressed the likelihood of out-migration, as did being employed. Again, education level appeared to predict out-migration, but the descriptive results should be interpreted with caution as they may mask an age cohort effect. Similarly, a smaller percentage of parents than non-parents out-migrated. Household infrastructural variables of drink water source and sanitation, as well as tertiles of household assets, were suggestive of a relationship with out-migration, but the unadjusted odds ratios were non-significant. However, those living in a household without electricity were significantly more likely to out-migrate. A higher percentage of individuals in households without a pensioner out-migrated, compared to the other categories; the lowest percentage of out-migrants was found in households with a male or one or more pension-age-eligible adults of each sex.

Again death of another adult member of the household was a strong predictor of out-migration.

Moving to Table 3.3, among non-residents, a higher percentage of females (18.5%) than males (14.8%) in-migrated in the period. Those in the youngest age group had the highest percentage of in-migrants (23.8%) relative to the older ages, and those with had no partner or a casual partner were also more likely to return. While 22.2% of those who were unemployed in-migrated, only 12% of those employed did so. No clear pattern was evident in the distribution of migrants by education level. A higher percentage of those who were a parent in-migrated, but this relationship is not seen for the variable measuring co-household membership with the child. Households with better infrastructure (for all three measures) appeared more successful at drawing non-residents back to the DSA, yet there appeared to be no clear relationship between household assets and the likelihood of in-migration. Relative to individuals from households with no pensioner, those from households with one or more male or male and female pensioners had a lower likelihood of in-migration; those with a female pensioner did not differ from the non-pensioner group in their level of in-migration. Finally, the death of another adult in the household again strongly predicted the return migration of non-residents.

Table 3.4 shows selected measures of central tendency in the household characteristics of migrants and non-migrants, by type of migration; and again unadjusted odds of migration for each explanatory variable is shown. As shown, among residents, those who internally migrated or out-migrated had a higher mean number of young children aged 0 to 4, and each additional young child increased the odds of internal migration by 7% and out-migration by 3%. Non-migrants had a higher dependency ratio

than migrants: each unit increase in the ratio of dependents to working-age adults in the household reduced the odds of internal migration by 7% and out-migration by 12%. Each additional full-time working adult in the household (not the index individual) increased an individual's odds of out-migration by 7%. In the third column, among non-residents, few statistically significant differences were seen between in-migrants and non-migrants in the household-level measures shown. It should be noted that these measures pertain to the household within the DSA of which the non-resident is a member—not to the household in which the non-resident resides outside of the DSA. Household-level variables are thus necessarily less proximate- physically- to the non-resident.

Socio-economic and demographic predictors of migration: multiple logistic regression models.. Tables 3.5 through 3.7 show a summary of results of multiple logistic regression models of the factors predictive of internal migration, out-migration and in-migration, respectively, within the two-year period following the HSE visit. Each table shows three models, in the total adult population, and separately in the populations of adult women and men. As the population of residents is greater than non-residents, the models shown in Tables 3.5 and 3.6 had greater statistical power to detect relationships between the explanatory variables and the dependent variables of internal migration and out-migration, respectively, compared to the models of in-migration among non-residents shown in Table 3.7.

Beginning with the total adult population column in Table 3.5, significant relationships between explanatory variables and internal migration within two years are summarized here. Net of the effects of the other covariates in the model, male residents had lower odds of internal migration relative to female residents (OR=0.53), confirming

the first hypothesis. The odds of internal migration were no different for those aged 23 to 37 relative to those aged 18 to 22; the odds are reduced only in older age groups (OR=0.58 in those 38 to 50 and OR=0.28 in those over 50, relative to the youngest group). The odds of internal migration were more than double for those with no current partner (OR=2.22) or a current non-marital partner (OR=2.43) relative to those who were married. Employment status had no statistically significant association with internal migration, nor did the level of education, although those who were a full-time student were significantly less likely to internally migrate (OR=0.69) relative to those with the lowest level of education, net of the effects of age and other covariates. Being a co-member of a household with at least one child under the age of 18 also suppressed the likelihood of internal migration (OR=0.73). Clearly, being a resident and in school, or having a school-aged child, reduces the likelihood of changing residences within the area.

Looking to the individuals' household characteristics, we see that those who had access to an electricity source had a lower odds of internal migration (OR= 0.84). One's number of household assets was also negatively associated with a move: those in the middle quantile had almost 20% lower odds (OR=0.82) and in the higher quantile over 30% lower odds (OR=0.67) of internally migrating relative to those in the poorest households as measured by the number of assets. Finally, those who mourned the loss of another adult in their household in the period had 23 times the odds of internally migrating following that death, relative to those who experienced no adult death in the home. Whether there was a pension-age-eligible adult in the household, of either sex, had no effect on internal migration, nor did the household dependency ratio.

Comparing these overall population findings with those of the models among the

populations of adult men and women, we note that while among men, only those over 50 had significantly lower odds of internally migrating (OR=0.40) relative to the youngest group, and among women in this age group the odds ratio was 0.29, women but not men aged 38 to 50 also were significantly less likely to individually internally migrate (OR=0.57). Marital status, as predicted, has a more pronounced effect on the internal migration behavior of women than men; the odds of migrating for non-marital groups compared to those married were higher among women. Meanwhile, being employed, which was not a predictor of migration in the total population, significantly increased the odds of migration for men only (OR=1.41); this finding was counter to the hypothesized relationship. Also for men only, those with the highest education level were less likely to internally migrate relative to those with the lowest level of education (OR=0.70). In contrast, the measures of household living conditions and assets affected the odds of internal migration for women only, and not for men.

Shown in Table 3.6 are the results of three logistic regression models of determinants of out-migration in the adult population of residents, and men and women respectively. As shown, male residents had a 52% higher odds of out-migrating relative to female residents, net of the effects of the other covariates, and confirming the first hypothesis. Age was significantly negatively associated with out-migration, for the total population and the sub-populations of men and women, although the effect of age appeared more pronounced for men. While being married significantly reduced the likelihood of out-migration, this effect in the total population was driven by its importance for women: those with no partner (OR=2.2) or a non-marital partner (OR=2.17) had more than double the odds of out-migrating relative to married women.

For men, having a non-marital vs. marital partner only somewhat increased the odds of out-migration (OR=1.22), and the effect was marginally significant.

Confirming the hypothesis, being employed at the time of the HSE visit significantly reduced the odds of out-migrating in the two year period after the visit (OR=0.87). This effect was driven by its importance for men, in whom those employed had an almost 20% lower odds of out-migrating. For women, the effect of being employed was weaker and only marginally significant. Sex differences are also seen in the effect of education level on out-migration: overall, having a higher education level was associated with a greater odds of out-migrating, but this effect was most pronounced for women. Overall, being a full-time student reduced the odds of out-migrating, but this was driven by its significance for men, while in women there was no difference in the odds of migrating for students, relative to those with the lowest education level. Again, as with the finding for internal migration, and confirming the hypothesis, being a parent in the same household as one's child reduced the odds of out-migrating, but this effect in the overall population was driven by its significance for women only, in whom mothers residing with their children had a 35% lower odds of out-migrating.

Among household characteristics, having access to electricity in the home reduced the odds of out-migrating by some 25% overall, and somewhat more strongly among men (OR=0.65, vs. 0.84 among women). Living in a household with the highest tertile level of assets relative to the lowest, meanwhile, increased the odds of out-migrating for men (OR=1.25) but not for women. Experiencing the death of another adult in the household was again a powerful predictor of migration subsequent to the death, and this effect was especially pronounced for women (OR=6.0 vs. 4.77 among

men). Finally, the presence of a male pensioner in the household (or one or more pensioners of both sexes) reduced the odds of out-migration for men only (OR=0.77, relative to those with no pensioner in the home.)

Table 3.7 shows multiple logistic regression models of the determinants of in-migration, for non-residents, within two years of the HSE visit. Again confirming the first hypothesis related to the sex composition of in-migrants, males remain less likely to in-migrate (OR=0.84), net of the effects of the other covariates. In this population, the youngest age group is again the most mobile and likely to return to the area, and the odds of in-migration decrease with age up until the oldest age group, who reduced odds of in-migration are smaller than for those in the middle of the age distribution. For non-residents, partnership status has no effect on the odds of in-migration, but employment status does, and for both men and women: employed women had approximately 40% lower odds and men, 50% lower odds of in-migrating, relative to their unemployed counterparts. Also, relative to those with the lowest level of education, those with higher levels of education had a lower odds of returning to the area; similarly, non-residents who were currently in school (in the area in which they resided on the date of the HSE visit) quite expectedly had lower odds of in-migrating within two years, relative to those with the lowest level of completed education. These effects, while statistically significant for both sexes, were more pronounced for men than for women, perhaps reflecting the better labor market returns on education for men living outside of the DSA, as has been suggested by prior research.

Those who were a parent linked to a child in the members' household in the DSA had a higher odds of in-migration (OR=1.21), and counter to expectation, this effect was

more pronounced for men (OR=1.31) than for women (OR=1.19), among whom the effect was also only marginally significant. There were also sex differences in the effects of household infrastructural variables on the odds of in-migration: for men only, having a DSA household with electricity increased the odds of in-migrating (OR=1.37), while for women, having good household sanitation facilities increased the odds of in-migration (OR=1.39), possibly reflecting gender differences in the value placed on these types of household conditions. The number of assets, however, had no effect on the odds of in-migrating for either men or women.

An adult death in the DSA household powerfully predicted the subsequent in-migration of non-resident women (OR=8.8) and men (OR= 10.12). The presence of a male pensioner or one or more pensioners of both sexes in the household suppressed the in-migration of both men and women, but to a greater extent for women (OR=0.65 for women and 0.76 for men) , while the presence of one or more female pensioners reduced the odds of in-migration for women only (OR=1.14). Finally, the dependency ratio within the DSA household increased the odds of in-migration for women only (OR=1.14); each unit increase in the ratio of dependents to working-age adults increased the odds of a woman's in-migration by 14%.

Sex differences in the determinants of recent level of absence from the household. Shown in Table 3.8 are the findings of ordered logit regression models of the determinants of the number of nights spent at home in the four months prior to visit (subsequent to the HSE 1 visit), in the total adult population and by sex. To enhance the parsimony and interpretability of the models (given that the dependent variable is ordinal, with five levels), simplified versions of the independent variables are used; each is either

continuous or dichotomous. For dichotomous variables, reference categories are footnoted below the table. The dependent variable is coded so that the level of presence in the household decreases with each level: 1. present in the household every night, 2. present most nights, 3. present approximately half, 4. present few nights, and 5. present no nights. In this model, a negative (-) coefficient indicates *decreased* log odds of a step increase in the level of absence from home in the previous four months, while a positive coefficient indicates increased log odds of a step increase in absence. The coefficients can be exponentiated to give odds ratios which represent the odds of a step to the subsequent level. The cutpoints (a.k.a. thresholds) shown below the ordered logs-odds regression coefficients are used to differentiate the adjacent levels of the dependent variable when values of the independent variables are held at zero.

As shown in the 'Total adult population' columns in Table 3.8, all of the independent variables in the model significantly predicted increased absence from the household in the previous four months. Holding other independent variables constant, being male increased the odds of a step increase in absence from the household by about 26% (exp(0.231)=OR 1.26). Each additional year of age decreased the odds of a step increase towards absence from home only slightly at 2% (exp(-0.015)= OR 0.98). Being employed more than doubled the odds of a step increase in the amount of time away from home (exp(0.873)=OR 2.39). A one-item increase in the number of household assets slightly decreased the odds of a step increase in absence from home, by 4% (exp(-0.038)= OR 0.96). Each additional year of education increases by 3% the odds of a step increase in absence from home (exp(0.034)= OR 1.03). Ever having been married decreases odds of a step increase in absence by almost 30% (exp(-0.332)= OR 0.72). A child in the

household (ages 0 to 14) increases odds of a step increase by 24% (exp(0.215)= OR 1.24) while being a parent decreases it by 20% (exp(0.220)= OR 0.80). Finally, the presence of any pension-eligible adults in the household increases the odds of absence by 20% (exp(0.184)= OR 1.20).

When we compare the ordered logit model coefficients for the model run on the total adult population with that of the adult populations of men and women, respectively, we see that the sizes of the coefficients for several of the variables are similar for men and women; namely age, number of household assets and education level. However, others show a stronger effect for women or men: being employed more strongly decreases the odds of a step increase in absence from home for men than for women (OR=2.77 vs. 1.98 for women). Ever having married decreases the odds of a step increase in absence more markedly for women than men (OR=0.59, vs. 0.90 for men). While the presence of a child increases the odds of a step increase by 50% for men, the variable is non-significant for women; yet being a parent decreases the odds of a step increase more strongly for women than men (OR=0.56 vs. 0.89 for men)
Finally, presence of a pension-eligible adult appears more important for predicting absence from the household for women than for men (OR=1.29, vs. 1.16 in men).

Sex differences in reasons for migration. Information on the reasons for migration are collected somewhat inconsistently in ACDIS. Nevertheless, some data are available on the reasons that individuals gave for their change in residence. There are many open-ended responses collected in ACDIS, which has not yet been qualitatively coded, but ACDIS also records a set of close-ended responses on reasons for migration, and these are shown in Table 3.9, for the first in- and internal migrations within two years

of the HSE (these are grouped in the table, as they are linked in ACDIS to residency starts) and the first out-migration within the period (linked to residency ends), for men and women. The data are not representative of the full set of records of migrations of these types, as they were only sporadically recorded. But they do provide quasi-qualitative information suggestive of some of the main motivations of community members to undertake a move, and of gendered patterns in the reasons given.

The reason most often given for any move was "for accommodation", and women appeared somewhat more likely to offer this reason. For internal or in-migration, the second most-frequently given reason for the move was "left employment", and men offered that reason more frequently than did women. The second most frequently given reason for out-migration was "to be near place of work", and men offered this reason more frequently. Men also more frequently offered "searching" as a reason for out-migration; this response comprised the fourth largest category of reasons given for this type of migration, followed by "employment", again more frequently given as a reason by men. Among internal and in-migrants, men also more often indicated employment or the search for employment as a reason for a move.

Women more frequently than men offered "schooling" as a reason for all types of migration; and a similar category, "education", was a frequent reason given for both men and women. "To be cared for", "sickness", and being "well" after a period of illness was also a frequent reason given for the migrations of all types of both men and women. For women more than men, however, the reason "caring" was also given frequently as a reason for internal and in-migration. Women were also more likely to indicate that they moved in order to be near a spouse or conjugal partner.

As these data are limited and not representative, definitive conclusions regarding sex differences in the motivations for migration in this population on the basis of the findings shown in Table 3.9 are not warranted. The findings are merely suggestive of motivations linked to gendered roles and norms, with men more frequently than women offering responses linked to their employment outside the home, and women more frequently than men indicating motivations linked to their role as caregivers and accompanying partners. They also underscore the ubiquitousness of work and health-related issues that precipitate the need for a change of residence for the adults living in this rural area affected by high levels of unemployment and HIV/AIDS.

Limitations. The data shown in this chapter are subject to the same limitations described in Chapter 2; those limitations are not described again here. Several analytical problems presented in the previous chapter are addressed here, of course, as I examine sex differences in migration patterns in a multivariate framework. Some limitations of the logistic regression approach are also addressed here with the additional of survival analyses to test the same hypotheses. Still further steps could have been taken throughout, and were not, for the sake of parsimony of the presentation; for instance, I modeled only the first migration event, while a repeated event history analysis could have been undertaken which would have provided more information over a number of years, and I could have included both time invariant and time-variant predictors in the models. I include a simpler set of analyses here in part because I have used a number of dependent variables to measure migration, and have carried out three sets of models by migration type using logistic regression models. Further modeling would have resulted in a proliferation of findings that may have obscured the key hypothesis tests I have

undertaken. Further, I anticipate that the predictors of first migration events are likely to be the same as those that would predict subsequent migrations, and using a repeated event modeling approach may not have yielded a great deal of added value.

I undertook here to model the predictors of individual migration events, and not household migrations, again simply to limit the scope of investigation shown here. Finally, for this analysis, I was not able to generate a full retrospective history of events for individuals, such as their past migrations or past experiences of deaths within and outside the household. Such information may have enhanced an understanding of the migration behaviors of individuals living in the demographic surveillance area, but this must remain a limitation as these are not known for periods earlier than the start of surveillance.

Discussion. The findings presented in this chapter showed the sex differences in the composition of the 'migrant stock' hold up even when one accounts for the many factors that drive migration. Confirming the descriptive findings shown in Chapter 2, but also net of the effects of other factors, women were more likely than men to make a local move within the DSA and also to return to the area, while men were more likely to out-migrate from the area. Several of the hypotheses presented at the beginning of this chapter were confirmed: as expected, younger age was associated with all types of migration, but it was less informative of the internal migration behavior of women: women continued to internally migrate throughout their thirties, and odds of internal migration only more markedly declined in the older ages. Younger males were particularly likely to out-migrate. Also as expected, marital status strongly suppressed the migration of women, but not of men. Net of the effects of age and other covariates,

women without a husband had double or more than double the odds of their married counterparts of migrating. The ordered logit model of determinants of absence from the household in the past four months further confirms the importance of marital status for suppressing the migration of women: ever having been married decreased the odds of a step increase in absence more markedly for women than men. The finding would support both the conclusion that that household income supports from a husband differs in kind and importance from the support of male non-marital partners in terms of their negative influence on female labor migration, and also the conclusion that social norms related to the marital role work to suppress the migration of women.

I hypothesized that being currently employed would suppress the migration behavior of men and women, but particularly of men. While this was true for models of in-migration and out-migration, being currently employed increased the likelihood of internal migration for men. While on the surface this is counter-intuitive, the finding may point to men's changes of residence to live closer to the place of employment within the DSA. As the centers of employment in or near the DSA are concentrated along the N2 highway, the DSA is rather large and the proportion of employed men in the area is small, that a proportion of these employed males would move from a less rural place perhaps to a place closer to work is quite plausible. Clearly, overall, being employed supports stability: it keeps non-residents from in-migrating, and suppresses the out-migration of residents. Conversely, migration from the area appears to be a key strategy for seeking employment in order to provide income support to rural households.

Having a higher level of education suppressed internal and in-migration, but predicted a greater likelihood of out-migration, and this effect was particularly

pronounced for women. Previous research in South Africa found that among men, those with the highest level of education were more likely to stay in rural areas, where their employment prospects were as good as in urban areas (van der Berg, Burger et al. 2002); education played a weaker role in women's employment probabilities (Ibid.). Further, while unemployed males tended to not be competitive in either rural or urban labor markets, they were nevertheless migrating out of rural areas in search of employment (Ibid.) The finding in some senses may support this research, in the sense that while the labor market returns on education, and local employment prospects, are not as favorable for women as for men, perhaps rural women sense that their prospects outside of the area are better, or are as promising as those of women from the urban areas. Yet whether this finding is a marker of improved labor market returns on education for women, or reflects the aspirational aspects of higher education for women linked to their pursuit of opportunities via migration, cannot be determined from these data.

As expected, individuals from households with poorer infrastructure were more likely to migrate, perhaps both as a strategy to assist with household livelihood and also to seek better housing conditions; those who were already non-resident were less like to return to such households. Yet this effect seemed particularly pronounced for men, a finding that was not expected. While better household condition such as access to electricity suppressed migration, a higher number of assets in the household appeared to facilitate the out-migration of men only.

I hypothesized that individuals from households with a higher household dependency ratio, that is with a higher number of dependents relative to the number of working-age adults, would be less likely to internally migrate or out-migrate, and more

likely to in-migrate; and I expected that this effect would be more pronounced for women. Yet I thought that a higher dependency ratio could also mark a greater need for the supportive income of working-age adults, and could thus facilitate migration, countering the aforementioned effect. In fact, the latter effect was not seen, and the former was: for women only, a higher dependency ratio increased their likelihood of return to the DSA. The findings were suggestive that a higher dependency ratio suppresses the out-migration of women, although this effect was marginally significant. Hypotheses related to the role of pensioners in constraining and facilitating migration were in some instances confirmed and in others, rejected: the presence of a pensioner affected only the likelihood of in-migration, and did not, as hypothesized, increased women's likelihood of out-migration. The presence of a pensioner in the DSA household did appear, as expected, to reduce women's likelihood of returning to the area, but this did not depend upon the sex of the pensioner. Instead, women with a household of at least one male or at least one of each sex of pensioner (the larger proportion within the category) were least likely to in-migrate. This finding suggests that perhaps it is more the number of pension-aged adults in the home (who, moreover, would provide more than one old-age pension to the household, in addition to providing an extra child care-giver to the home), that reduces the need for female non-residents to return and reside again in the DSA.

An additional hypothesis of this study was that co-membership in a household in which an individual has a child would suppress internal migration and out-migration, but may facilitate the in-migration ('return to the DSA') of those who are non-resident, particularly women. This hypothesis was both confirmed and rejected: being a parent who was a co-member of a household in which one's children was a member did

suppress the out-migration of women and not that of men. However, this factor was no more predictive of women's than men's lower likelihood of internal migration, and for men only, being a parent linked to a child in the household predicted a greater likelihood of in-migration. This finding suggests the possibility that in a context of high AIDS mortality among women, a significant proportion of fathers are returning to the DSA to take on a care-giving role following a maternal death. The finding would seem to support the ethnographic research of Montgomery and colleagues conducted in the Umkhanyakude area (Montgomery, Hosegood et al. 2006), describing the increasing involvement of men in care-giving and parenting following the death of a female partner, with often little social recognition or social support. Although this is not explored in this chapter, at least some proportion of the male non-resident in-migration would be accounted for by a return to the area following the death of a female partner.

Indeed, the findings presented here underscore the influence of very high levels of AIDS-related mortality on the mobility of the population, as previously documented (Hosegood, McGrath et al. 2004; Hosegood, Vanneste et al. 2004; Ford and Hosegood 2005). Prior research (Welz, Hosegood et al. 2007) showed that overall in this population, 27% of female and 13.5% of male residents were HIV infected in 2003-04, and that HIV prevalence peaked at 51% (95% CI 47-55%) among resident women aged 25-29 in that year. AIDS has been the leading cause of death in adulthood (48%) at least since 2000; in that year, the probability of dying between ages 15 and 60 was 58% for women and 75% for men (Hosegood, Vanneste et al. 2004). This analysis has built upon the prior research on the impact of mortality on mobility in this population by documenting the effect of adult mortality on the individual migration behavior of other

adults. Deaths of other adults in the household was a powerful trigger of all types of migration, but especially internal migration within the area, and secondarily a return to the demographic surveillance area for non-resident household members. This factor strongly predicted the subsequent migration of both men and women, but was especially pronounced for men.

In summary, building upon the findings shown in the previous chapter, the more nuanced measures used in this study from a demographic surveillance system, including measures of in-, out- and internal migration and household presence pattern within a local predominantly rural area, erase any assumed predominance of males in migration, and reveal distinct sex differences in the patterns and types of migration. The determinants of migration events vary by the type of migration event, whether it be a local migration, a migration away from a rural area, or a return-migration to it. Moreover, the factors that precipitate or constrain migration are by no means the same for women and women. The findings shown here support the notion that gendered opportunity structures- both those related to labor and marriage markets, and to the gendered social norms that influence the role expectations and behaviors of women and men- are actively implicated in producing sex differences in patterns of migration in rural South Africa. The level of mobility in this population is extraordinarily high, and gender is intrinsic to the social transformations that both fuel this mobility and are fueled by it.

Table 3.1: Population characteristics by type of migration within two years after HSE visit: Any internal migration, of residents (Unadjusted odds ratios with 99% CI)

Independent variables	N of non-Migrants	N of Migrants	Row % Migrated	Unadj. OR	95% CI	
Sex: Female	14,953	943	5.9			
Sex: Male	9,973	400	3.9	0.64	0.56	0.72
Age group: 18-22	5,044	384	7.1			
23-28	4,044	334	7.6	1.08	0.93	1.26
29-37	4,516	291	6.1	0.85	0.72	0.99
38-50	5,186	196	3.6	0.50	0.42	0.59
Over age 50	6,136	138	2.2	0.30	0.24	0.36
Partnership pattern: No current partner	7,335	381	4.9			
Marital partner	6,567	121	1.8	0.35	0.29	0.44
Regular non-marital partner	9,684	748	7.2	1.49	1.31	1.69
Casual partner	940	65	6.5	1.33	1.01	1.75
Employment status: Unemployed	17,391	952	5.2			
Full or part-time employment	7,511	390	4.9	0.95	0.84	1.07
Education level: None or <1 year	5,646	217	3.7			
Standard 1-5	6,903	364	5.0	1.37	1.16	1.63
Standard 6-9	5,156	318	5.8	1.60	1.34	1.91
Standard 10 (Matric)	3,358	202	5.7	1.57	1.29	1.90
Diploma, Bachelor's or Master's	933	59	6.0	1.65	1.22	2.21
Full-time student	2,678	168	5.9	1.63	1.33	2.01
Parenthood: Not a parent	7,360	423	5.4			
Is a parent	17,566	920	5.0	0.91	0.81	1.03

Table 3.1 continued on next page:

Table 3.1, continued: Population characteristics by type of migration within two years after HSE visit: Any internal migration, of residents (Unadjusted odds ratios with 99% CI)

Independent variables	N of non-Migrants	N of Migrants	Row % Migrated	Unadj. OR	95%	CI
Parenthood: Not linked as parent to children in household	17,592	1,025	5.5			
Identifiable as parent to children in his/her household	7,334	318	4.2	0.74	0.65	0.85
Household drink water source: Other source	14,809	832	5.3			
Piped (private/public)	10,108	509	4.8	0.90	0.80	1.00
Household sanitation: Other or none	22,327	1,223	5.2			
Flush toilet/VIP	2,599	120	4.4	0.84	0.70	1.02
Household electricity access: No source of electricity	12,116	736	5.7			
Has electricity source (grid or generator)	12,810	607	4.5	0.78	0.70	0.87
Number of household assets: Lower quantile (0-2)	6,763	471	6.5			
Middle quantile of assets (3-6)	10,766	580	5.1	0.77	0.68	0.88
Higher quantile of assets (7-17)	7,397	292	3.8	0.57	0.49	0.66
Pension age-eligible adults in household: None	14,622	788	5.1			
1 or more males or both sexes	3,150	139	4.2	0.82	0.68	0.98
1 or more females only	7,154	416	5.5	1.08	0.95	1.22
Deaths of other adults in household within 2 years: None	14,953	748	4.8			
≥1 Adult death before 1st internal migration in 2 years	113	147	56.5	26.01	20.13	33.59
≥1 Adult death, but not before 1st internal migration within 2 years, or death but no internal migration within 2 years	9,860	448	4.4	0.91	0.81	1.02

Table 3.2: Population characteristics by type of migration within two years after HSE visit: Any out-migration, of residents (Percentages and unadjusted odds ratios from univariate logistic regression models with 99% CI)

Independent variables	N of non-Migrants	N of Migrants	Row % Migrated	Unadj. OR	95% CI	
Sex: Female	13,732	2,164	13.6			
Sex: Male	8,092	2,281	22.0	1.79	1.68	1.91
Age group: 18-22	3,612	1,816	33.5			
23-28	3,145	1,233	28.2	0.78	0.72	0.85
29-37	4,104	703	14.6	0.34	0.31	0.38
38-50	4,929	453	8.4	0.18	0.16	0.20
Over age 50	6,034	240	3.8	0.08	0.07	0.09
Partnership pattern: No current partner	6,263	1,453	18.8			
Marital partner	6,290	398	6.0	0.27	0.24	0.31
Regular non-marital partner	8,270	2,162	20.7	1.13	1.05	1.21
Casual partner	682	323	32.1	2.04	1.77	2.36
Employment status: Unemployed	15,012	3,331	18.2			
Full or part-time employment	6,796	1,105	14.0	0.73	0.68	0.79
Education level: None or <1 year	5,463	400	6.8			
Standard 1-5	6,339	928	12.8	2.00	1.77	2.26
Standard 6-9	4,300	1,174	21.5	3.73	3.31	4.21
Standard 10 (Matric)	2,622	938	26.4	4.89	4.31	5.54
Diploma, Bachelor's or Master's	863	129	13.0	2.04	1.65	2.52
Full-time student	2,001	845	29.7	5.77	5.07	6.56
Parenthood: Not a parent	5,601	2,182	28.0			
Is a parent	16,223	2,263	12.2	0.36	0.34	0.38

Table 3.2 continued on next page:

Table 3.2, continued: Population characteristics by type of migration within two years after HSE visit: Any out-migration, of residents (Percentages and unadjusted odds ratios from univariate logistic regression models with 99% CI)

Independent variables	N of non-Migrants	N of Migrants	Row % Migrated	Unadj. OR	95%	CI
Parenthood: Not linked as parent to children in household	14,960	3,657	19.6			
Identifiable as parent to children in his/her household	6,864	788	10.3	0.47	0.43	0.51
Household drink water source: Other source	12,969	2,672	17.1			
Piped (private/public)	8,846	1,771	16.7	0.97	0.91	1.04
Household sanitation: Other or none	19,541	4,009	17.0			
Flush toilet/VIP	2,283	436	16.0	0.93	0.84	1.04
Household electricity access: No source of electricity	10,547	2,305	17.9			
Has electricity source (grid or generator)	11,277	2,140	16.0	0.87	0.81	0.93
Number of household assets: Lower quantile (0-2)	6,061	1,173	16.2			
Middle quantile of assets (3-6)	9,399	1,947	17.2	1.07	0.99	1.16
Higher quantile of assets (7-17)	6,364	1,325	17.2	1.08	0.99	1.17
Pension age-eligible adults in household: None	12,640	2,770	18.0			
1 or more males or both sexes	2,819	470	14.3	0.76	0.68	0.85
1 or more females only	6,365	1,205	15.9	0.86	0.80	0.93
Deaths of other adults in household within 2 years: None	13,691	2,569	15.8			
≥1 Adult death before 1st out-migration in 2 years	368	541	59.5	7.83	6.82	9.00
≥1 Adult death, but not before 1st out-migration within 2 years, or death but no out-migration within 2 years	7,765	1,335	14.7	0.92	0.85	0.98

Table 3.3: Population characteristics by type of migration within two years after HSE visit: Any in-migration, of non-residents (Percentages and unadjusted odds ratios from univariate logistic regression models with 99% CI)

Independent variables	N of non-Migrants	N of Migrants	Row % Migrated	Unadj. OR	95%	CI
Sex: Female	4,846	1,097	18.5			
Sex: Male	6,565	1,136	14.8	0.76	0.70	0.84
Age group: 18-22	2,147	669	23.8			
23-28	3,129	646	17.1	0.66	0.59	0.75
29-37	3,085	450	12.7	0.47	0.41	0.53
38-50	2,205	300	12.0	0.44	0.38	0.51
Over age 50	845	168	16.6	0.64	0.53	0.77
Partnership pattern: No current partner	2,224	546	19.7			
Marital partner	1,817	285	13.6	0.64	0.55	0.75
Regular non-marital partner	6,323	1,156	15.5	0.74	0.67	0.83
Casual partner	690	176	20.3	1.04	0.86	1.26
Employment status: Unemployed	4,559	1,298	22.2			
Full or part-time employment	6,836	932	12.0	0.48	0.44	0.53
Education level: None or <1 year	1,146	233	16.9			
Standard 1-5	2,811	539	16.1	0.94	0.80	1.12
Standard 6-9	3,037	558	15.5	0.90	0.76	1.07
Standard 10 (Matric)	2,825	537	16.0	0.93	0.79	1.11
Diploma, Bachelor's or Master's	543	76	12.3	0.69	0.52	0.91
Full-time student	838	251	23.1	1.47	1.21	1.80
Parenthood: Not a parent	4,881	813	14.3			
Is a parent	6,530	1,420	17.9	1.31	1.19	1.43

Table 3.3 continued on next page:

Table 3.3, continued: Population characteristics by type of migration within two years after HSE visit: Any in-migration, of non-residents (Percentages and unadjusted odds ratios from univariate logistic regression models with 99% CI)

Independent variables	N of non-Migrants	N of Migrants	Row % Migrated	Unadj. OR	95%	CI
Parenthood: Not linked as parent to children in household	8,983	1,779	16.5			
Identifiable as parent to children in his/her household	2,428	454	15.8	0.94	0.84	1.06
Household drink water source: Other source	7,507	1,403	15.8			
Piped (private/public)	3,887	829	17.6	1.14	1.04	1.25
Household sanitation: Other or none	10,555	2,012	16.0			
Flush toilet/VIP	856	221	20.5	1.35	1.16	1.58
Household electricity access: No source of electricity	6,624	1,172	15.0			
Has electricity source (grid or generator)	4,787	1,061	18.1	1.25	1.14	1.37
Number of household assets: Lower quantile (0-2)	3,099	589	16.0			
Middle quantile of assets (3-6)	5,162	966	15.8	0.98	0.88	1.10
Higher quantile of assets (7-17)	3,150	678	17.7	1.13	1.00	1.28
Pension age-eligible adults in household: None	6,500	1,343	17.1			
1 or more males or both sexes	1,472	234	13.7	0.77	0.66	0.89
1 or more females only	3,439	656	16.0	0.92	0.83	1.02
Deaths of other adults in household within 2 years: None	6,169	1,178	16.0			
≥1 Adult death before 1st in-migration in 2 years	165	252	60.4	8.00	6.51	9.83
≥1 Adult death, but not before 1st in-migration within 2 years, or death but no in-migration within 2 years	5,077	803	13.7	0.83	0.75	0.91

Table 3.4: Population characteristics by type of migration within two years after HSE visit (Measures of central tendency)

	Any internal migration within 2 years of HSE, of residents					Any out-migration within 2 years of HSE, of residents					Any in-migration within 2 years of HSE, of non-residents				
	Mean, non-migrants (SD)	Mean, migrants (SD)	Un-adj. OR	95%	CI	Mean, non-migrants (SD)	Mean, migrants (SD)	Un-adj. OR	95%	CI	Mean, non-migrants (SD)	Mean, migrants (SD)	Un-adj. OR	95%	CI
Household size	9.54 (5.14)	9.54 (5.41)	1.00	0.99	1.01	9.43 (5.14)	10.07 (5.18)	1.02	1.02	1.03	10.69 (5.17)	10.45 (4.94)	0.99	0.98	1.00
Children ages 0-4	1.28 (1.26)	1.40 (1.27)	1.07	1.03	1.12	1.28 (1.25)	1.33 (1.27)	1.03	1.01	1.06	1.35 (1.31)	1.31 (1.27)	0.98	0.94	1.01
Children ages 5-9	1.32 (1.20)	1.34 (1.24)	1.01	0.97	1.06	1.33 (1.33)	1.30 (1.19)	0.98	0.96	1.01	1.40 (1.25)	1.36 (1.24)	0.98	0.94	1.01
Children ages 10-17	2.09 (1.60)	2.10 (1.69)	1.00	0.97	1.04	2.09 (1.60)	2.12 (1.65)	1.01	0.99	1.03	2.22 (1.66)	2.21 (1.59)	1.00	0.97	1.02
Household dependency ratio	1.17 (0.88)	1.12 (0.82)	0.93	0.87	1.00	1.20 (0.90)	1.03 (0.70)	0.78	0.74	0.81	1.05 (0.71)	1.06 (0.70)	1.03	0.97	1.10
Adults with full-time employment	1.58 (1.44)	1.57 (1.44)	0.99	0.96	1.03	1.56 (1.42)	1.70 (1.50)	1.07	1.05	1.09	2.15 (1.62)	1.88 (1.51)	0.90	0.87	0.92

Notes: Data for Table 3.4 show means, standard deviations, and the undjusted odds ratios fom univariate logistic regression models for each characteristic by migration type.

Table 3.5: Socio-economic and demographic determinants of internal migration within two years of HSE: Adult population of residents, total and by sex (Multiple logistic regression models with robust standard errors)

Characteristic	Model 1: Adult population of residents				Model 2: Resident women				Model 3: Resident men			
	OR	*p*	95% CI		OR	*p*	95% CI		OR	*p*	95% CI	
Sex												
Female												
Male	0.53	0.000	0.466	0.603								
Age group												
18-22												
23-28	1.00	0.981	0.830	1.200	0.99	0.936	0.795	1.235	1.12	0.522	0.799	1.557
29-37	0.93	0.497	0.753	1.148	0.92	0.532	0.713	1.191	1.13	0.521	0.778	1.642
38-50	0.58	0.000	0.454	0.739	0.57	0.000	0.428	0.760	0.75	0.214	0.485	1.176
Over age 50	0.28	0.000	0.215	0.365	0.29	0.000	0.208	0.394	0.40	0.001	0.230	0.700
Partnership status												
Marital partner												
No current partner	2.22	0.000	1.733	2.831	2.31	0.000	1.749	3.059	2.14	0.002	1.333	3.420
Current non-marital partner	2.43	0.000	1.910	3.088	2.93	0.000	2.248	3.808	1.58	0.044	1.013	2.456
Employment												
Unemployed												
Full or part-time	1.12	0.111	0.974	1.292	1.02	0.864	0.852	1.209	1.41	0.006	1.103	1.790
Education level												
None through Standard 5												
Standard 6 to 9	0.90	0.240	0.759	1.072	0.91	0.392	0.742	1.124	0.86	0.310	0.634	1.156
Standard 10 (Matric) or higher	0.84	0.088	0.692	1.026	0.91	0.465	0.720	1.162	0.70	0.046	0.494	0.993
Full-time student	0.69	0.003	0.534	0.879	0.70	0.029	0.515	0.964	0.67	0.047	0.450	0.995
Parent to children in household												
Not linked as parent												
Parent to ≥ 1 child in household	0.73	0.000	0.616	0.856	0.74	0.001	0.621	0.885	0.63	0.018	0.425	0.922

Table 3.5 continued on next page

Table 3.5, continued: Socio-economic and demographic determinants of internal migration within two years of HSE: Adult population of residents, total and by sex (Multiple logistic regression models with robust standard errors)

Characteristic	Model 1: Adult population of residents				Model 2: Resident women				Model 3: Resident men			
	OR	*p*	95% CI		OR	*p*	95% CI		OR	*p*	95% CI	
Household infrastructure												
No source of electricity												
Has electricity source	0.84	0.022	0.717	0.975	0.75	0.001	0.627	0.891	1.07	0.624	0.824	1.382
Other source drinking water												
Piped (private/public)	0.98	0.833	0.853	1.137	1.03	0.711	0.874	1.219	0.90	0.418	0.710	1.153
Sanitation: Other or none												
Flush toilet/VIP	1.16	0.222	0.914	1.475	1.19	0.203	0.911	1.545	1.13	0.567	0.743	1.719
Household assets												
Lower quantile of assets (0-2)												
Middle quantile of assets (3-6)	0.82	0.010	0.699	0.952	0.83	0.039	0.691	0.990	0.81	0.099	0.623	1.042
Higher quantile of assets (7-17)	0.67	0.000	0.541	0.817	0.67	0.001	0.527	0.855	0.67	0.021	0.471	0.941
Adult deaths in household												
No other adult in household died												
≥1 Adult death before 1st migration	23.06	0.000	17.058	31.165	21.24	0.000	14.409	31.300	26.19	0.000	16.472	41.655
≥ 1 Adult death, but not before 1st migration, or no migration	0.85	0.024	0.738	0.979	0.86	0.077	0.732	1.016	0.81	0.092	0.637	1.035
Pension-age-eligible adult in household												
None												
1 or more males or both sexes	0.99	0.917	0.775	1.258	0.97	0.827	0.736	1.278	0.93	0.714	0.611	1.401
1 or more females only	1.05	0.523	0.898	1.236	1.05	0.615	0.872	1.261	1.07	0.607	0.821	1.401
Household dependency ratio	0.98	0.574	0.898	1.061	0.95	0.329	0.865	1.050	1.07	0.389	0.919	1.241
N	25,400				15,417				9,983			

Table 3.6: Socio-economic and demographic determinants of out-migration within two years of HSE: Adult population of residents, total and by sex (Multiple logistic regression models with robust standard errors)

Characteristic	Model 1 Adult population of residents				Model 2 Resident women				Model 3 Resident men			
	OR	*p*	95% CI		OR	*p*	95% CI		OR	*p*	95% CI	
Sex												
Female												
Male	1.52	0.000	1.406	1.637								
Age group												
18-22												
23-28	0.78	0.000	0.705	0.873	0.85	0.029	0.730	0.983	0.74	0.000	0.627	0.861
29-37	0.44	0.000	0.385	0.499	0.55	0.000	0.456	0.652	0.36	0.000	0.296	0.430
38-50	0.29	0.000	0.251	0.335	0.29	0.000	0.235	0.355	0.26	0.000	0.212	0.325
Over age 50	0.12	0.000	0.104	0.149	0.12	0.000	0.096	0.158	0.10	0.000	0.076	0.137
Partnership status												
Marital partner												
No current partner	1.54	0.000	1.338	1.783	2.20	0.000	1.807	2.675	1.04	0.732	0.827	1.311
Current non-marital partner	1.68	0.000	1.472	1.915	2.17	0.000	1.808	2.595	1.22	0.050	1.000	1.492
Employment												
Unemployed												
Full or part-time	0.87	0.002	0.792	0.951	0.88	0.058	0.774	1.004	0.82	0.002	0.719	0.929
Education level												
None through Standard 5												
Standard 6 to 9	1.23	0.000	1.108	1.366	1.27	0.002	1.093	1.473	1.19	0.021	1.026	1.374
Standard 10 (Matric) or higher	1.23	0.001	1.093	1.385	1.36	0.000	1.151	1.608	1.07	0.428	0.907	1.260
Full-time student	0.86	0.033	0.750	0.988	0.98	0.839	0.802	1.196	0.75	0.002	0.618	0.899
Parent to children in household												
Not linked as parent												
Parent to ≥ 1 child in household	0.75	0.000	0.675	0.834	0.65	0.000	0.570	0.739	0.95	0.533	0.792	1.128

Table 3.6 continued on next page

Table 3.6, continued: Socio-economic and demographic determinants of out-migration within two years of HSE: Adult population of residents, total and by sex (Multiple logistic regression models with robust standard errors)

Characteristic	Model 1 Adult population of residents OR	*p*	95% CI		Model 2 Resident women OR	*p*	95% CI		Model 3 Resident men OR	*p*	95% CI	
Household infrastructure												
No source of electricity												
Has electricity source	0.74	0.000	0.671	0.807	0.84	0.005	0.739	0.948	0.65	0.000	0.571	0.731
Other source drinking water												
Piped (private/public)	0.98	0.622	0.896	1.068	1.03	0.641	0.915	1.155	0.92	0.183	0.820	1.039
Sanitation: Other or none												
Flush toilet/VIP	0.99	0.897	0.862	1.140	1.10	0.286	0.920	1.327	0.86	0.132	0.704	1.047
Household assets												
Lower quantile of assets (0-2)												
Middle quantile of assets (3-6)	1.02	0.685	0.925	1.126	0.94	0.340	0.821	1.070	1.10	0.150	0.965	1.263
Higher quantile of assets (7-17)	1.18	0.007	1.045	1.327	1.08	0.350	0.920	1.266	1.25	0.007	1.062	1.478
Adult deaths in household												
No other adult in household died												
≥ 1 Adult death before 1st migration	5.41	0.000	4.468	6.551	6.00	0.000	4.604	7.811	4.77	0.000	3.730	6.112
≥ 1 Adult death, but not before 1st migration, or no migration	0.94	0.191	0.865	1.029	0.90	0.075	0.802	1.011	1.01	0.903	0.894	1.135
Pension-age-eligible adult in household												
None												
1 or more males or both sexes	0.83	0.015	0.715	0.965	0.90	0.301	0.732	1.101	0.77	0.008	0.629	0.932
1 or more females only	0.91	0.061	0.825	1.004	0.94	0.348	0.823	1.071	0.88	0.069	0.772	1.010
Household dependency ratio	0.96	0.180	0.916	1.017	0.95	0.149	0.887	1.018	0.97	0.399	0.895	1.045
N	25,400				15,417				9,983			

Table 3.7: Socio-economic and demographic determinants of in-migration within two years of HSE: Adult population of non-residents, total and by sex (Logistic regression models with robust standard errors)

Characteristic	Model 1 Adult population of non-residents				Model 2 Non-resident women				Model 3 Non-resident men			
	OR	*p*	95% CI		OR	*p*	95% CI		OR	*p*	95% CI	
Sex												
Female												
Male	0.84	0.001	0.76	0.935								
Age group												
18-22												
23-28	0.76	0.000	0.65	0.871	0.80	0.023	0.655	0.968	0.70	0.001	0.566	0.859
29-37	0.55	0.000	0.47	0.651	0.54	0.000	0.427	0.675	0.54	0.000	0.421	0.690
38-50	0.50	0.000	0.41	0.603	0.61	0.000	0.470	0.802	0.40	0.000	0.297	0.533
Over age 50	0.71	0.005	0.56	0.903	0.76	0.141	0.529	1.095	0.63	0.008	0.447	0.887
Partnership status												
Marital partner												
No current partner	1.00	0.974	0.82	1.218	0.90	0.470	0.665	1.207	0.97	0.846	0.727	1.298
Current non-marital partner	0.98	0.786	0.82	1.163	0.87	0.305	0.666	1.136	1.01	0.964	0.796	1.269
Employment												
Unemployed												
Full or part-time	0.54	0.000	0.48	0.603	0.59	0.000	0.501	0.687	0.49	0.000	0.419	0.574
Education level												
None through Standard 5												
Standard 6 to 9	0.85	0.013	0.74	0.965	0.92	0.400	0.755	1.119	0.79	0.009	0.660	0.943
Standard 10 (Matric) or higher	0.78	0.001	0.68	0.901	0.91	0.393	0.745	1.122	0.67	0.000	0.552	0.809
Full-time student	0.70	0.001	0.56	0.857	0.81	0.155	0.613	1.081	0.59	0.001	0.433	0.805
Parent to children in household												
Not linked as parent												
Parent to ≥ 1 child in household	1.21	0.005	1.06	1.382	1.19	0.054	0.997	1.420	1.31	0.012	1.062	1.610

Table 3.7 continued on next page

Table 3.7: Socio-economic and demographic determinants of in-migration within two years of HSE: Adult population of non-residents, total and by sex (Logistic regression models with robust standard errors)

Characteristic	Model 1 Adult population of non-residents				Model 2 Non-resident women				Model 3 Non-resident men			
	OR	*p*	95% CI		OR	*p*	95% CI		OR	*p*	95% CI	
Household infrastructure												
No source of electricity												
Has electricity source	1.19	0.003	1.06	1.340	1.05	0.558	0.892	1.236	1.37	0.000	1.166	1.607
Other source drinking water												
Piped (private/public)	1.06	0.339	0.94	1.179	1.13	0.128	0.966	1.322	0.99	0.873	0.847	1.151
Sanitation: Other or none												
Flush toilet/VIP	1.29	0.010	1.06	1.559	1.39	0.013	1.072	1.814	1.19	0.208	0.909	1.548
Household assets												
Lower quantile of assets (0-2)												
Middle quantile of assets (3-6)	1.01	0.899	0.89	1.147	1.16	0.110	0.967	1.391	0.88	0.143	0.735	1.045
Higher quantile of assets (7-17)	1.08	0.310	0.93	1.269	1.04	0.758	0.824	1.305	1.11	0.323	0.903	1.364
Adult deaths in household												
No other adult in household died												
≥1 Adult death before 1st migration	9.32	0.000	7.37	11.77	8.80	0.000	6.252	12.39	10.12	0.000	7.295	14.04
≥ 1 Adult death, but not before 1st migration, or no migration	0.88	0.024	0.79	0.983	0.83	0.020	0.714	0.972	0.93	0.389	0.802	1.090
Pension-age-eligible adult in household												
None												
1 or more males or both sexes	0.71	0.000	0.59	0.845	0.65	0.002	0.493	0.850	0.76	0.022	0.604	0.962
1 or more females only	0.89	0.070	0.79	1.009	0.84	0.040	0.706	0.992	0.94	0.468	0.795	1.111
Household dependency ratio	1.10	0.006	1.03	1.183	1.14	0.009	1.032	1.252	1.09	0.100	0.984	1.205
N	12,941				5,618				7,323			

Table 3.8: Ordered logit regression models of the determinants of the number of nights spent at home in the four months prior to visit (subsequent to HSE 1 visit), total population and by sex

Independent variable	Total adult population				Men				Women			
	Coef.	Std. Err.	t-Value	*p*	Coef.	Std. Err.	t-Value	*p*	Coef.	Std. Err.	t-Value	*p*
Sex (Male)	0.231	0.019	11.92	0.000	--	--	--	--	--	--	--	--
Age at HSE visit	-0.015	0.001	-17.48	0.000	-0.011	0.001	-7.93	0.000	-0.020	0.001	-17.11	0.000
Employed full or part-time	0.873	0.019	45.69	0.000	1.018	0.028	36.36	0.000	0.683	0.026	25.83	0.000
Number of household assets	-0.038	0.003	-12.47	0.000	-0.052	0.004	-11.8	0.000	-0.029	0.004	-6.94	0.000
Number of years of education	0.034	0.002	14.53	0.000	0.037	0.003	10.7	0.000	0.029	0.003	9.15	0.000
Ever married	-0.332	0.025	-13.26	0.000	-0.101	0.038	-2.64	0.008	-0.533	0.034	-15.83	0.000
Any child 0-14 in household	0.215	0.031	6.94	0.000	0.435	0.042	10.46	0.000	-0.002	0.046	-0.05	0.961
Is a parent	-0.220	0.022	-10.01	0.000	-0.112	0.032	-3.52	0.000	-0.574	0.033	-17.58	0.000
Any pension-aged adult in household	0.184	0.019	9.75	0.000	0.147	0.027	5.37	0.000	0.252	0.026	9.64	0.000
Cut1	-0.886	0.051	--	--	-0.556	0.071	--	--	-1.732	0.073	--	--
Cut2	0.544	0.051	--	--	0.722	0.071	--	--	-0.136	0.072	--	--
Cut3	1.232	0.051	--	--	1.433	0.072	--	--	0.548	0.072	--	--
Cut4	2.577	0.053	--	--	2.851	0.074	--	--	1.823	0.075	--	--

Note: Variables are either continuous or dichotomous with dummy-coding; reference categories in the latter case are: not employed, never married, no children in age range in household, is not a parent, and no pension-eligible adult in the household. The significance level for all models was set to 99%.

Table 3.9: Reasons for migration, by sex (first internal, in- and out-migration within two-year period following HSE 1 visit)

Reason	First internal or in-migration				First out-migration			
	Female	Row %	Male	Row %	Female	Row %	Male	Row %
Accommodation	1,766	52	1,633	48	1,757	55	1,457	45
Built or bought house	20	63	12	38	113	64	63	36
Came to destination for delivery	23	92	2	8	3	100	0	0
Caring	27	79	7	21	29	48	32	52
Changed jobs	7	28	18	72	187	48	206	52
Changed rented accommodation	4	57	3	43	5	45	6	55
Domestic violence or disagreement	4	67	2	33	19	79	5	21
Don't Know or No Reason	13	36	23	64	53	56	41	44
Education	22	56	17	44	306	53	274	47
Employment	15	27	41	73	261	37	442	63
Faction fights	0	0	0	0	3	100	0	0
Finished School	128	57	95	43	9	53	8	47
Household formation	2	50	2	50	8	53	7	47
Left Employment	242	37	405	63	3	50	3	50
Left School	12	55	10	45	2	33	4	67
Left employment as a domestic	12	71	5	29	11	61	7	39
Marriage or conjugal relationships	4	100	0	0	15	79	4	21
Perpetrator of crime	0	0	1	100	1	50	1	50
Pregnancy	6	100	0	0	2	100	0	0
Prison	1	8	11	92	0	0	43	100
Return to usual place of residence	13	93	1	7	0	0	0	0
Schooling	59	42	80	58	638	58	471	42
Searching	7	29	17	71	218	29	529	71
Sickness	44	43	59	57	23	55	19	45
Split	3	60	2	40	11	100	0	0
Start of new marriage or partnership	4	80	1	20	13	81	3	19
To be cared for	62	53	56	47	91	55	74	45
To be close to a spouse or a partner	16	70	7	30	43	91	4	9
To be near place of work	19	35	35	65	571	42	800	58
To care for someone	11	92	1	8	10	91	1	9
To look after a house	2	33	4	67	6	55	5	45
Traditional Healing	2	50	2	50	5	83	1	17
Transfer	14	42	19	58	10	40	15	60
Victim or fear of crime	0	0	2	100	2	15	11	85
Violence or conflict	0	0	0	0	10	91	1	9
Was caring for someone	2	100	0	0	0	0	1	100
Well (after period of illness)	28	49	29	51	5	83	1	17
Total	**2,594**	**50**	**2,602**	**50**	**4,443**	**49**	**4,539**	**51**

Notes

[i] Per Osterhammel, the term "colonization" refers a process of territorial acquisition, "colony" to a particular type of sociopolitical organization, and "colonialism" to a system of domination. (Osterhammel, 1997, p.4)

[ii] Hunter's ethnographic research in KZN vividly depicts the flow of work-seekers to the industrial areas that have shedded jobs: in the Isithebe Industrial Estate and surrounding informal settlement area, the population increased by an extraordinary 300-400% between 1996 and 2001, despite job losses: "The large number of unemployed women and men means that every weekday, hundreds of unemployed people move from factory to factory to *fesa* (seek work). Some have done so for more than two years without finding employment."
Hunter, M. (2004). From migrating men to moving women? Historical patterns of women's migration, Migration Working Group, Africa Centre for Health and Population Studies, 25 Nov. 2004., (p.13)

[iii] However, the researchers caution that this association is fragile: "Where social networks through extended family are strong enough to assume these childcare responsibilities, the net effect on children can be positive. Where not, children may experience neglect following migration of their mothers"
Kahn, K., M. Collinson, et al. (2003). Health consequences in migration: Evidence from South Africa's rural northeast (Agincourt). Conference on African Migration in Comparative Perspective, Johannesburg, South Africa.(p. 14)

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Chapter 4

Gender and the Consequences of Migration for HIV/AIDS in South Africa

Introduction. This chapter presents an analysis of sex differences in the HIV risks associated with migration in the adult population living in a primarily rural area in Umkhanyakude District, KZN, South Africa. This population differs from the one for which findings were presented in Chapters 2 and 3 in a key respect: the time period for eligible household membership is shifted just over two years forward, to 01 June 2003, when the population eligible for the first round of an annual HIV surveillance study of the Africa Centre for Health and Population Studies was established. The population also does not restrict, but includes, individuals who were members of more than one household, in order to maximize the available HIV data. This chapter also differs from the previous two, in that migration events preceding, rather than subsequent to, the household membership eligibility date are measured. While the first round of testing offers only a measure of HIV prevalent infection in the population (and it is impossible to know at what point in time individuals became infected with the virus), all information on the migration patterns, as well as their antecedents, temporally precede the HIV test date. Causality cannot be inferred, but the data will be informative. Further, an

analysis of the association between patterns of migration and HIV incidence, using information from those who participated in both of the first two rounds of HIV surveillance, will be carried out to interrogate whether the findings of cross-sectional analyses are confirmed by longitudinal data.

Studies linking migration to HIV in sub-Saharan Africa are numerous, having accumulated since nearly the start of the epidemic in the region. Yet, remarkably few studies have measured the HIV risks associated with migration for women, and fewer still have undertaken any sex comparison in the HIV risks associated with migration. None have done so in a South African population, and none have undertaken a direct statistical comparison of such risks for men and women (involving a pooled analysis of men and women, using interaction terms of the migration event by sex), to my knowledge, in any population in the region. This study will be the first to do so, and also the first to describe patterns of prevalent HIV infection by different types of migration and mobility. Such an analysis is needed in order to more fully understand the ways in which gendered patterns of migration may be contributing the wide sex disparities in HIV prevalence in South Africa, and to consider the HIV/AIDS prevention and care implications of such findings.

Benefits of migration. To balance this analysis of a key negative consequence of migration in southern Africa— HIV/AIDS, and its risk to the migrant and to the 'sending' communities to which he or she returns— I begin with a brief review of what are known to be the benefits of migration for migrants and their families. After all, voluntary migration would not be undertaken in South Africa were it not tied to aspirations and an expectation of improved life conditions. A body of literature on the

socio-economic benefits of migration is nearly as large as the literature on migration overall: it is a central theme to the discipline. Nearly every study of the impacts of migration focus on its key role in socio-economic mobility and development (e.g.)(Todaro 1976; Sabor 1979; Stark 1991; Massey, Arango et al. 1998; van der Berg, Burger et al. 2002; Kothari 2003; Zuberi and Sibanda 2004; Massey 2006; Tienda, Findley et al. 2006; Halliday 2007). Fewer studies have documented the socio-economic consequences of specifically *women's* migration in sub-Saharan Africa, but those that have are reviewed here: a highlight in the historical research is Bozzoli's documentation of the multi-generational social mobility that resulted from the migration of a generation of women from Phokeng (Bozzoli 1991). This account describes a multi-generational accumulation of socio-economic advantage for those who undertook a rural-to-urban migration: the children and grandchildren of female migrants in this community took advantage of opportunities for urban settlement, education and occupational mobility that were not available to the descendents of those 'left behind'.

Recent research from demographic surveillance sites in South Africa has also documented the benefits, to households, of sending a female migrant. Households clearly benefit from having any member who is a temporary labor migrant: these households have a higher socio-economic status than those who do not (Collinson, Tollman et al. 2003; Kahn, Collinson et al. 2003). Yet households especially benefit if the migrants is female: they remit more income to households than do male migrants, despite lower likelihood of formal employment (Posel and Casale 2003) and their lower earnings (Collinson, Tollman et al. 2003). Kahn and colleagues found a small protective effect on the health of children in households in which the mother was a migrant worker (Kahn,

Collinson et al. 2003), but cautioned that "where social networks through extended family are strong enough to assume these childcare responsibilities, the net effect on children can be positive. Where not, children may experience neglect following migration of their mothers." Indeed, Case, Ardington and colleagues have documented health and education risks to children living apart from their mothers (Collinson, Tollman et al. 2003; Case and Ardington 2004; Case, Hosegood et al. 2005; Ardington, Case et al. 2007).

Kothari has explored the factors that permit people to participation in migration, positing that an individual's level of access to various forms of capital (human, social, political, economic and so on) characterizes the degree to which they are excluded from the migration process (Kothari 2003), and other research tends to confirm that a modicum of resources is required for migration: poverty is a cause of migration, but the poorest households are unable to send a migrant (Collinson, Tollman et al. 2003). At individual level, socio-economic position (measured, e.g., by education level, employment status or income) is associated with the decision to migrate: individuals move to seek employment, escape from poverty and provide financial support to the families they leave behind (Ibid.; (van der Berg, Burger et al. 2002; Posel and Casale 2003). For the most part, migration confers a distinct economic benefit to both female and male migrants and to the households in which they are members.

The HIV/AIDS-related consequences of migration in southern Africa. While the economic benefits of migration in sub-Saharan Africa are clear, the health benefits of voluntary migration in the region are more mixed. Specifically, the role of migration in the spread of infectious disease, and especially HIV/AIDS, is well-researched: urban

areas, with social conditions which facilitate high sexual partner change rates and elevated probabilities of transmission, are frequently the reservoirs of HIV infection that then spreads to more remote areas via the corridors of major population movement. Since the early stages of the southern African pandemic, infections in rural areas have been traced to those who had been in urban areas (Jochelson, Mothibeli et al. 1991; Garin, Jeannel et al. 1993; Glynn, Ponnighaus et al. 2001; Coffee, Garnett et al. 2005); infection rates have been higher along roads (Wawer, Serwadda et al. 1991; Barongo, Borgdorff et al. 1992; Tanser, Lesueur et al. 2000); and truckers have been found to be at higher risk because of their greater mobility (Bwayo, Plummer et al. 1994; Mbugua, Muthami et al. 1995; Glynn, Ponnighaus et al. 2001; Ramjee and Gouws a 2002). More recent research has focused on the implications of mobility for the spread of HIV-1 genetic diversity (Perrin, Kaiser et al. 2003).

The bulk of literature on the role of migration in the spread of HIV/AIDS in southern Africa (and in the region overall) has almost exclusively focused on the strikingly high HIV risks to male labor migrants. Numerous studies in the region have found labor migration to be a risk factor for men and their non-migrant female partners (Jochelson, Mothibeli et al. 1991; Nunn, Wagner et al. 1995; Lurie, Harrison et al. 1997; Brockerhoff and Biddlecom 1999; Hope 2000; Hope 2001; Lurie, Williams et al. 2003; Coffee, Garnett et al. 2005; Desmond, Allen et al. 2005; Zuma, Lurie et al. 2005).

In his critique of the public health literature on migration and HIV/AIDS, Hunter (2007) was the first to note that few studies have interrogated the assumption that migration is predominantly circular, or examined the contribution of women's migration to HIV. This literature has presumed a stable female-headed household to and from

which male migrants circulate; generally, the mobility of female partners has not been measured, and HIV risks to female partners were presumed to result purely from unprotected sexual contact with the migrant male partner (or another partner). For example, an often-cited study on HIV and migration in South Africa found that migrant men were 2.4 times more likely than non-migrant men to be HIV-infected (Lurie, Williams et al. 2003). In 71.4% of discordant couples in which the male partner was a migrant, the male was the infected partner; but in a full one-third of these couples (29%), the female- whose patterns of mobility were not measured- was the infected partner (Lurie, Williams et al. 2003).

Notable exceptions to the research measuring the HIV risks to men only include an early study by Karim and colleagues (Abdool Karim, Abdool Karim et al. 1992) finding that migration increased infection risk by almost three-fold for women and seven-fold for men in KwaZulu-Natal. Strikingly, after this study in 1990, no other South African study examined the role of migration in HIV infection in women until 2003, when Zuma and colleagues examined migration among women residing near a mining area in South Africa (Zuma, Gouws et al. 2003). This study found a 60% higher odds of HIV infection (OR 1.6) in migrant vs. non-migrant women; migrant women were older, were also more likely to report having had two or more partners in the past year, and were less likely than non-migrant women to have used condoms. This study undertook no sex comparison, but was limited to women.

These studies are joined by three others from the region, which found higher risk behavior and HIV prevalence in mobile compared to women with stable residence in Tanzania (Boerma, Urassa et al. 2002; Kishamawe, Vissers et al. 2006), Senegal (Pison,

Le Guenno et al. 1993) and Cameroon (Lydie, Robinson et al. 2004). Some of these studies compared not only stable versus migrant women, but also examined the migration-related risks of HIV for men and women, respectively; migration-related HIV risk appeared to be higher for men (Pison, Le Guenno et al. 1993; Lydie, Robinson et al. 2004), although a statistical test of the sex difference in the migration-attributed HIV risk was not undertaken. In contrast, a study in Tanzania showed that men's mobility had no affect on their risk behavior or HIV status, but those whose female partner was a migrant reported higher risk behavior (Kishamawe, Vissers et al. 2006). No study to date has compared the risks of HIV to migrant men versus migrant women in South Africa.

Such a comparison is important for understanding the role that migration may have played in producing the startlingly disparate levels of HIV prevalence in South African men and women: a recent study from KZN found 27% of adult women versus 13.5% of adult men were HIV-positive (Welz, Hosegood et al. 2007). Because a sex comparison of the HIV risks related to migration has not been undertaken, the full contribution of migration to these large sex differentials in HIV risk is unknown. Further questions remain about the role of gender in the migration processes of men and women which would facilitate the levels of HIV risk to which they are exposed: given that men and women migrate to different types of places, are they therefore exposed to sexual networks with differential levels of HIV prevalence? HIV prevalence varies widely by types of geographic areas even in regions where epidemics are mature (i.e., and HIV/AIDS research has increasingly focused on HIV transmission "hot spots": environments in which levels of HIV prevalence in networks of sexual partnerships are high, increasing the probability of infection within a given sexual act for individuals exposed to those networks (Morris

and Kretzschmar 1997; Garnett 2002). As described previously, women are more likely than men to migrate to informal settlements or small towns in predominantly rural areas (Lurie, Harrison et al. 1997; Collinson, Tollman et al. 2003; Hunter 2006). High levels of HIV prevalence have been documented in South African urban mining areas, ports and other large male migrant labor destinations since the early stages of the epidemic (e.g.) (Jochelson, Mothibeli et al. 1991; Williams and Campbell 1998), but more recently, population-based studies in South Africa have found rates of HIV to be almost twice as high in informal settlement areas, compared to urban and rural areas (Shisana and Simbayi 2002; Pettifor, Rees et al. 2004; Shisana, Rehle et al. 2005).[i] This finding is matched in other research in the region showing higher HIV prevalence rates in informal settlement areas, relative to rural or urban areas (Boerma, Urassa et al. 2002; Coffee, Garnett et al. 2005).

Alternatively, are men or women differentially more likely to engage in higher risk sexual behaviors because of migration? Qualitative research illuminates the social reality underlying studies of HIV prevalence in such settings, the common destinations of female migrants in southern Africa: the economic opportunities available in small towns, work sites and informal settlement areas (in contrast to the poverty of surrounding rural areas), are accessed by men primarily through at least sporadic access to formal employment, and by women through offering sex in exchange for money or gifts (Hunter 2002; Desmond, Allen et al. 2005; Hunter 2006), not only by women who identify as commercial sex workers (e.g. see (Campbell 2000)) but by a variety of women (Desmond, Allen et al. 2005). Hunter has highlighted how movement between rural and urban areas can foster a woman having more than one “main” lover; it is these men with whom condoms are the

least likely to be used (Hunter 2004). Moreover, in a context of declining marital rates (Hosegood and Preston-Whyte 2002; Posel 2004; Hosegood, McGrath et al. 2008), pre-marital sexual relationships have become characterized by a sex-money exchange, particular among younger sexually-active adults (Hunter 2002; Selikow, Zulu et al. 2002; Posel 2005).[ii]

In summary, remarkably, to date no study has compared the patterns of mobility of South African men and women, nor has any study compared sexual behavior and HIV infection rates of male and female migrants and non-migrants in South Africa, despite very high rates of internal migration and of HIV prevalence in the nation. Research is needed to elucidate the ways in which the gender dynamic of migration affect patterns of HIV/AIDS in South Africa. Can South Africa's explosive HIV/AIDS epidemic be explained by the proliferation of 'high risk environments', characterized by large sexual networks in which HIV is highly prevalent, and transactional sex, which is typified by frequent changes in sexual partnerships and inconsistent condom use? What role does migration play, as a social antecedent to the growth of transmission 'hot spots' and the behavioral risks associated with them? Greater clarity needed on sex differences in the *determinants* of migration and in the *consequences* of migration related to HIV/AIDS. The role of gender in producing these sex differences has yet to be explored. It is hoped that this study will contribute to an improved understanding of the relationship between HIV/AIDS and migration in South Africa, by elucidating the risks that migration poses to men and women, using a full range of measures to ensure that those risks are measured adequately for women, and exploring what may account for those risks.

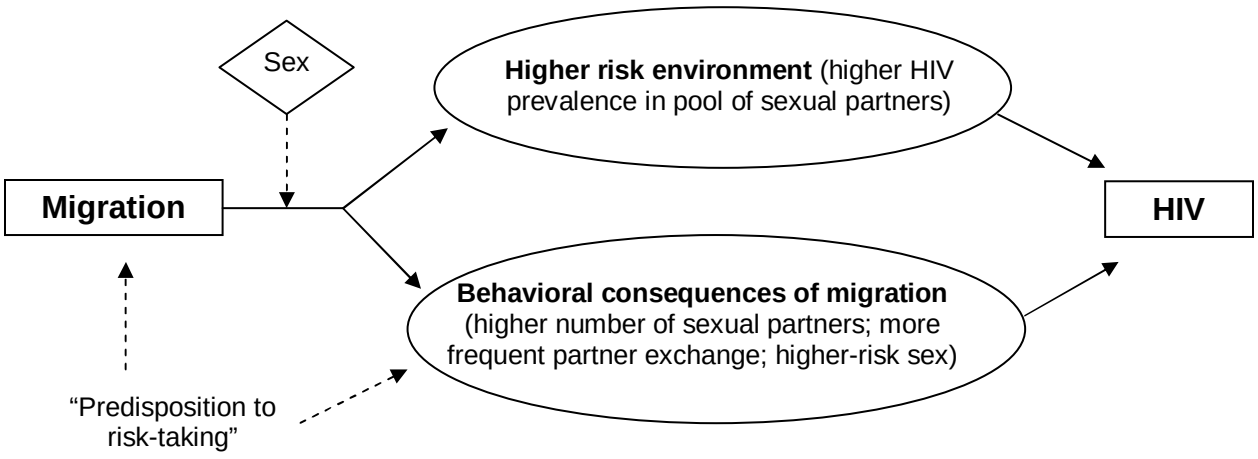
An analysis of the HIV risk associated with migration for women and men in a predominantly rural area of KwaZulu-Natal, South Africa. This study addresses a major gap in the research on HIV and migration. Its are: a) to establish whether gender differences in patterns of migration in South Africa partially account for sex differences in HIV infection rates; and b) to identify the possible causal mechanisms by which migration patterns help to explain women's disproportionately high risk of HIV infection. The analyses are carried out using a set of unique data from a demographic surveillance located in Umkhanyakude District. The setting and data source for this study have been described in the previous chapters and that description is not repeated here. A key contribution of this analysis is that, as in the previous chapters, it uses a range of measures that more thoroughly capture women's patterns of migration and mobility than those typically utilized in studies of migration and HIV/AIDS.

Research questions and hypotheses. The following questions are pursued in this analysis: Does migration increase the odds of HIV infection for men and women equally, net of the effects of other factors that influence risk? Are certain patterns of migration more sensitive than others for the prediction of HIV risk, and do these vary by sex? To what degree are the large sex differentials in HIV risk accounted for by differences in men's and women's patterns of movement? Are there sex differences in the level of HIV risk that migration confers because men and women migrate to different types of places, and are thus exposed to sexual networks with differential levels of HIV prevalence? Alternatively, are men or women differentially more likely to engage in higher risk sexual behaviors because of migration?

The key hypotheses embedded within these questions are displayed in Figure 4.A.

Figure 4.A posits, principally, that migration leads to an increased HIV risk, via two main mechanisms: 1) migrants may have a greater HIV infection risk because the places to which they migrate-- and the sexual networks to which they are exposed-- may be higher in HIV prevalence than the places from which they originated; and 2) the social context of migration, related to social instability, anonymity, and financial hardship, leads to higher risk sexual behavior among migrants than non-migrants. Secondly, sex may modify the relationship between migration and HIV risk: social disadvantages to women may increase their migration-related risk of HIV relative to that of men who migrate. Thirdly, various characteristics of individuals may predispose them both to migrate and to engage in higher risk sexual behavior.

Figure 4.A: Factors that link migration to HIV risk in South Africa



I will first determine whether migration and sex independently predict HIV infection in the population, net of the effects of "risk predisposition" and any other covariates of infection. I then will determine whether sex differences in infection rates

can be partially predicted by sex differences in patterns of migration, i.e., whether there is a significant interaction between sex and migration, and migration confers a greater HIV risk to women than to men.

Should this hypothesis be confirmed, I will undertake further analyses to clarify whether sex differences in the migration risk associated with HIV are at least in part due to the sex composition of the population of migrants i.e., '*migration results in a higher risk of HIV among women than among men, because there are more females among the migrants*, rather than solely due to true sex differences in the 'effect' of migration; i.e., *'migration confers a greater risk to women than to men'*. (Because 'composition' is not part of the causal pathway, it is not displayed in Figure 4.A.) Descriptive data and findings of logistic regression will be used to address the counterfactual question, what would the prevalence of HIV be in male migrants, if men had the same migration risk as women? I will force an 'equality' of migration effect by assigning women's migration-associated HIV risk (derived from the OR for migration for women) to men's distribution of migrants vs. non-migrants, and generate new, *simulated* HIV prevalence estimates for males.[iii] The same exercise will be carried out for females. The simulated and actual estimates will be compared to determine whether sex differences in migration-associated HIV risks are compositional, or are due *only* to sex differences in the 'effect' of migration.

It is possible that both composition *and* sex differences in the 'effect' of migration could influence sex differences in HIV infection. Thus, regardless of whether or not the 'compositional hypothesis' is rejected, I will proceed with analyses to determine a possible causal mechanism to explain any observed sex difference in the risks associated with migration, i.e., *men's and women's behavioral responses to migration differ: female*

migrants engage in higher risk sexual behavior than male migrants. Should this hypothesis not be supported, i.e., there are no significant differences in the sexual behavior of male and female migrants, the findings point to the 'higher risk environment' hypothesis: female migrants are more likely than male migrants to migrate to destinations high in HIV prevalence, where they have a higher probability of infection for any given act of unprotected sex. *Migration confers a greater risk to women than to men, because female migrants are exposed to sexual networks higher in HIV prevalence than are male migrants.*[iv] With the available data, I cannot directly test this hypothesis. However, should the third hypothesis be supported (sex and migration interact to predict a higher odds of infection for female migrants), and if neither composition nor behavioral differences can account for the finding, the finding would point to this hypothesis as an explanation that should be pursued in further research. Thus, the research questions and associated hypotheses will be addressed in the following sequence:

1.) Are HIV infection rates higher among females than among males, regardless of migration status? *Hypothesis: The odds of HIV infection are higher among females than males.*

2.) Are HIV infection rates higher among migrants than non-migrants, for both sexes? *Hypothesis: The odds of HIV infection are higher among those who migrate relative to those who do not, net of the effects of sex and other covariates.*

3.) Can sex differences in HIV infection rates be partially explained by sex differences in migration patterns? *Hypothesis: The odds of HIV infection are higher for female migrants than for male migrants (and non-migrants of both sexes).* Should this hypothesis be confirmed, I will examine three possible explanations for the finding:

a) *Composition: the HIV risk associated with migration differs for men and women because women are more likely than men to migrate.* The sex composition of the population of migrants may partially account for any observed sex difference in the 'effect' of migration on the odds of HIV infection.

b) *Heterogeneous behavioral consequences: The behavioral consequences of the decision to migrate vary by sex.* Women who migrate may be more likely than their male counterparts to engage in higher risk sexual behavior. Do sex differences in the sexual risk behavior of migrants and non-migrants 'explain' an interaction between sex and migration in the prediction of HIV risk?

c) *Higher risk environment hypothesis: Migration confers a greater risk to women than to men.* There may be differences in HIV prevalence in the sexual networks women and men are exposed to in the destinations to which they migrate.[v] This hypothesis cannot be directly tested using the data available for this study; yet if hypotheses 3. a) and b) are rejected, findings point to the possibility that HIV risk is greater for female migrants than male migrants (and male and female non-migrants) due to higher prevalence levels in their migration destinations. If warranted, I will examine whether sex, migration and behavior together (in a three-way interaction) predict HIV infection risk. This tests whether, for a given level of sexual risk behavior, such behavior places female migrants at greater risk of HIV than it does for male migrants or non-migrants of either sex. The hypothesis to be tested is that sexual behavior affects HIV risk differently for men and women; and the relationship is further modified by whether an individual is a migrant.

Methods

Dataset development. The first round of an annual HIV surveillance study was carried out in the DSA from 2003 to 2004. An 'eligibility list' was generated using ACDIS data using the date of June 1, 2003; those eligible for participation in the HIV survey were all men aged 15 to 54, and all women aged 15 to 49, who were registered members of households and resident within the surveillance area, and a random sample of 12.5% of registered household members within the age range for each sex who resided outside of the surveillance area, on that day; this was intended to be an open cohort to be re-selected annually. The existing ACDIS database at the time was used as sampling frame, and stratification was carried out by sex and by the place where the non-resident was living (i.e. urban center vs. other rural area).

This analysis uses all current available data for the population, and for the non-resident sample. However, rather than to combine the population and the sample I analyze data for the non-residents separately, and focus these analyses on the population. I do so because the estimates for the population are much more stable, and the population much more representative of the 'true' population, than is the case for the sampled non-residents. To explain further: current ADCIS data show that there were 47,001 individuals who were age-eligible for testing (by sex) and were members of at least one household membership on 01 June 2003. Further examination of the database showed that 545 of these individuals lacked essential 'member status observation' data either before 01 June 2003, or within a year following that date. Because very limited time-relevant data would be available for those individuals, they were dropped from the

dataset, yielding a final population of 46,456 individuals. Of these individuals, 30,022 (64.6%) are now classified as having been a resident household member on that date, and 16,434 (35.4%) are now known to have been a non-resident household member on that date. The original 12.5% sample of non-residents resulted in the collection of HIV test data for 2,025 sampled individuals, of whom n=1,808 are retrospectively seen to have been eligible for testing on 01 June 2003; of these 1,808 individuals, 530 (29.3%) participated in testing. Yet updated information reveals that only 1,547 of the 1,808 individuals were actually non-resident at the time (261 were not). Thus, of the 16,434 eligible actual non-residents on that date, only 1,547 (9.4%) were sampled, and only 428 (2.6%) participated in testing.

Thus, rather than to pool data from this very specific sample, with limited representativeness, with data from the overall population (and to use the sample weights associated with sample selection probabilities from that time), I analyze them separately and focus this analysis on the n=44,648 individuals eligible for testing who were not included in the original non-resident sample. For some analyses, I further restrict the data to the population of individuals who were truly resident members of households on that date.

According to records of that time, and as described previously (Welz, Hosegood et al. 2007), 19,867 of all eligible individuals were successfully contacted, and it was previously reported that some 58% of contacted individuals consented to test for HIV (56.4% of males and 59.4% of females). Updated data shown in this chapter suggest that 22,092 individuals were successfully contacted; 12,098 (54.8%) of these individuals participated in testing (and met the criteria for this analysis; some individuals who

participated in testing are not included in this analysis as it is retrospectively seen that they were not age-eligible, or were not household members on 01 June 2003.)

A limitation of this study is that the outcome measure, HIV infection, is likely to be subject to selection bias, due to systematic differences between those participated in HIV testing and those who did not. Fortunately, data from ACDIS were available for those who opted out of the HIV test survey, permitting analytical comparisons of the characteristics of 'testers' and 'non-testers' in order to determine, to the extent possible, the direction and strength of the selection bias. I corrected the data for sample selection bias on fifteen observable covariates of testing[v] using Propensity Score weighting. The purpose of generating a propensity score is to determine the propensity of responding (i.e., participating in HIV testing) for all of the members of the population, which is then used as a non-response adjustment weight in the analyses. As described by Little and Rubin (2002), the non-response bias on these observable characteristics can be corrected with use of the *Weighted Complete-Case Analysis*; in which respondents are weighted differentially (on the basis of observable characteristics of non-respondents) to make them more representative of the population. In the method, X_i covariates are observed for both respondents and non-respondents; *M* is the missing data (participation in testing) indicator (where non-respondent = 0 and respondent = 1). The propensity score specification is estimated using a logit model, i.e.:

$$\ln[\Pr(M = 1) / (1 - \Pr(M = 1))] = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots \beta_i X_i$$

Where X_i … represents the covariates of testing. The predicted probabilities from this model are the 'propensity scores'. I then weight the respondents by dividing the

mean HIV test participation rate by the predictions of the regression, i.e. weight=r(mean tested) / Pr(M = 1). This propensity score weight was then used as a frequency weight when generating percentages of the population by certain characteristics, and was used as a frequency weight when fitting the substantive models shown in this chapter.

The dataset used for this analysis also included information from the second round of a Household Socio-Economic Survey (HSE) of individuals and households, which was carried out in the same time period as the first HIV surveillance study, in 2003 and largely the first half of 2004. Of the 46,456 age-and sex-eligible population, HSE round 2 data are available for 42,570 (91.6%). Missing values for non-participants are coded as such for categorical variables in order to retain as large as possible a population for substantive modeling; where values for continuous variables were missing, the missing value was imputed using the mean value for the non-missing population. The dataset also includes information on partnership status and recent pattern of presence in the household, collected prior to the HIV test visit date or 01 June 2003 with the use of other ACDIS questionnaires.

Finally, the dataset uses information on sexual behavior, collected in the same round as the HIV test data, for men and women using the Men's and Women's General Health Forms (MGH and WGH). Participation rates in the first MGH and WGH were low, particularly among men: of the 21,619 age- and membership-eligible males (in the population, not the non-resident sample), only 5,901 (27.3%) participated in the questionnaire; of the corresponding 23,029 females, 11,293 (49%) participated. Moreover, individual item non-response is moderately high for some items (particularly the sensitive sexual behavior measures.) Missing data were coded as such for categorical

variables; for continuous variables, missing data were conservatively imputed with appropriate mean values.

Data collection. The Africa Centre's initial data collection in 2000 established the foundation for a longitudinal surveillance system. Routine data collection includes descriptive characteristics of homesteads and households, demographic data on all individuals and detailed reproductive histories for all women aged 15 to 49. Almost annually (in 2001, 2003, 2004 and 2005), the DSS collected data on measures of socioeconomic position of individuals and households (e.g. education, employment, household income and assets), housing and health-care use. During 6-monthly update rounds, data are updated and births, deaths and migrations (both within ACDIS and outside) are recorded.

HIV surveillance. A population-based serological survey for HIV, to be performed annually, was established in 2003 as an additional component of data collection. Every resident adult member of ACDIS is asked to consent to an HIV-test once every year during a data collection round. HIV testing (ELISA) uses the fingerprick dried blood spot method.[vi] The first round of HIV data were collected between June 2003 and December 2004 for all eligible residents. As previously noted, all females aged 15 to 49 years and all males aged 15 to 54 years resident in ACDIS are eligible for HIV-testing; men were included up to age 54 since the age at infection and age at onset of AIDS is typically 5 to 10 years later in men than in women.

Behavioral surveillance. The collection of data on sexual behavior in the MGH and WGH paralleled the surveillance design: since June 2003, behavioral data are collected annually among all eligible residents and in the random, stratified sample of

12.5% of non-residents. The Centre adopted two methods for the collection sexual behavior data: 1) a standard face-to-face interview format; and 2) a "voting box" methodology to reduce the social desirability bias associated with the collection of sensitive data. The two methods were implemented in order to be able to determine what approach is most useful for obtaining valid data on sexual behavior in subsequent annual data collection rounds.

Secret voting methodology. Previous research had shown that data collection methods that combine face-to-face interview with confidential self-completion methods can reduce social desirability bias in surveys of sexual behavior and provide more reliable data on the behavioral determinants of the spread of STIs than other methods (Gregson *et al.*, 2002b). This bias can occur when data are sought on attitudes or experiences that conflict with dominant local social norms: respondents may tend to provide a socially desirable response based on their perceptions of the views of the person(s) conducting the interview. The Africa Centre adapted for its use a methodology which proved acceptable to a rural, basic-literate population in an area of high HIV prevalence.[vii] This methodology combined the guidance of an interviewer to build rapport and motivation and to clarify questions, and respondent self-completion of an answer sheet to guarantee privacy of his or her responses to sensitive questions. In this method, the interviewer reads aloud the questionnaires item, one at a time, and the respondent marks his or her answers in the appropriate box on an answer sheet. Voting boxes have lids that respondents can use as screens to conceal what they write, and are pre-locked with keys held by supervisors. After completing the answer sheet, respondents are instructed to place it into the box. Responses to sensitive questions are not spoken aloud,

and information provided is kept secret from interviewers. I evaluated whether there was a statistically significant difference in the responses provided in the context of the two data collection methods in men, women, and the total population, respectively, to determine whether a 'method' variable should be included when fitting substantive models for these analyses. No differences were detected; therefore such a variable was not included.

Variables. As in the previous chapters, several measures of migration and mobility were used for these analyses, but in this chapter the measures are retrospective, valid for the period between the start of the DSS in 2000 until 01 June 2003, the 'eligibility' date for HIV testing. I constructed several dichotomous measures: a measure of any individual or household migration of any type since the start of the DSS (vs. none); any individual in-migration (vs. none) since the start; any individual internal migration (vs. none) since the start; and any individual out-migration (vs. none) since the start. I also constructed more recent versions of these variables, valid for the period of two years prior to 01 June 2003. I also examine the number of migrations by type for the period, and use a summary categorical measure of none, 1 and 2 or more migrations since the start and in the prior two years.

A sensitivity analysis was carried out for the measures of sexual behavior from the MGH and WGH (only those in common for both men and women, so that pooled analyses could be carried out). The variables most predictive of HIV infection were: the reported numbers of partners in the lifetime, past year and concurrently; ever use of a condom; perceived personal risk of HIV infection in the past or present; and previously received counseling and testing for HIV. These were selected for use in further modeling.

As described in Chapter 3, there are systematic differences between the group of individuals who decide to migrate, and those who do not. In Chapter 3, I explored these factors as explanatory variables in migration decision models. In this Chapter, these are treated as 'control' variables, as I am primarily concerned with the direct effect of migration on HIV status, and whether this differs for men and women.

The factors predictive of migration may in turn influence whether or not individuals engage in the higher risk sexual behavior associated with HIV infection. In Figure 4.1, I have termed this set of characteristics "predisposition to risk behavior" for the sake of brevity. On the basis of prior research, and also on the data available to this study, I will test the hypothesis that "risk predisposition" (or, the likelihood of both migrating and being vulnerable to higher risk sexual behaviors) can be predicted by age, employment status, education level, marital/partnership status, and measures of household socio-economic status (infrastructural variables and tertiles of the number of household assets). I also include a measure of whether the individual experienced the loss of another adult in his or her household to AIDS or another cause in the period between the start of the DSS and 01 June 2003. This factor may both predispose an individual to migrate, but also, in the case of AIDS deaths in the household, may be a marker of a greater likelihood of HIV infection in the index individual. (I also include here a measure of whether the individual died between 01 June 2003 and 01 January 2007; of the independent variables used in modeling for this chapter, this variable alone measures an event which occurs – potentially– after the HIV test; in all other cases, independent variables are valid for the period prior to the test.) Having already determined, in the previous chapter, that these factors are associated with the decision to

migrate, I confirm these findings in the HIV surveillance-eligible population; any covariates will be included as control variables in the full substantive models described in the next section.

Statistical analysis procedures. Following descriptive analyses, logistic regression modeling will be carried out using a dichotomous measure of HIV infection status (0= HIV-negative and 1= HIV-seropositive test result) as dependent variable in all models. I begin with additive effects models, to examine the independent effects of sex and migration on HIV infection risk, net of the effects of other covariates. I use three models to test the hypothesis that migration increases HIV infection risk, the first using a global measure of migration, the second using a measure of recent mobility, and the third using a measure of migration frequency. I then carry out three multiplicative effects models to explore whether the risk of HIV associated with migration varies by sex, using an interaction term of sex*migration type for each of the three migration variables.

Secondly, I introduce measures of sexual behavior to in a set of models, to test whether they independently predict HIV infection, net of the effects of migration and other covariates. I also explore whether sexual behavioral risk interacts with sex to predict HIV infection, fitting the model with a sex*behavioral risk interaction term. If warranted, I explore any potential three-way interaction between sex, migration, and behavioral risk, to test the hypothesis that women who engage in higher risk behavior and who migrate have the greatest odds of HIV infection, relative to male migrants and non-migrants, and female non-migrants.

For two-tailed tests of the null hypothesis that odds ratio = 1, logistic regression models are used to predict the odds of HIV infection for each group of independent

variables. The model is expressed as:

$$\text{Logit} = \log[p_i/1\text{-}p_i] = x_i\text{'}b$$

$$\text{where } xi\text{'}b = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_i x_{i\ldots}$$

denoting the (K+1) x 1 vector of regression coefficients to be estimated (Powers and Xie 2000). Table 1 in this chapter shows the unadjusted odds ratios from univariate logistic regression models of each of the independent variables on each of the dependent variables, with age added as an additional control variable. The selection of final variables for multiple logistic regression models was informed by both the hypotheses and by the level of significance of the associations seen in the univariate models. In some cases, therefore, variables were included in the multiple logistic regression models because of their hypothesized importance on the basis of the prior research, even though their bivariate associations with HIV infection in this analysis were non-significant.

Equations involving interaction terms follow the same logic of expression; for example, a test of the hypothesis that sex interacts with migrant status to predict the odds of HIV infection, controlling for age, is expressed as:

$$\text{Logit} = \log[p_i/1\text{-}p_i] = x_i\text{'}b$$

$$\text{where } xi\text{'}b = \beta_0 + \beta_1 x_1 (\beta_2 x_2 \; x \; \beta_3 x_3)$$

with $x_2 \; x \; x_3$ representing the interaction of sex (with female coded as "1") with migrant vs. non-migrant status, and x_1 again denoting the variable for age.

Results. ***Description of the population, and characteristics associated with HIV prevalence.*** Figures 4.1 and 4.2 graphically display the levels of HIV prevalence by

age group and sex in the population and the non-resident sample, respectively. As described previously (Welz et al., 2007), recent HIV prevalence in the population is among the highest reported. Overall, in 2003-04, HIV prevalence was 14% among male residents (0.13-0.15, 95% CI) and 28% (0.27-0.29, 95% CI) in their female counterparts. Prevalence peaked at 45% among resident men in the age group 30 to 34, and at 52% among resident women in the age group 25 to 29. Levels of HIV prevalence were yet higher in the sample of non-resident household members, particularly women; yet as shown these estimates are less precise due to the small number of non-residents sampled who also participated in HIV testing (n=530). Overall, prevalence was 36% in non-resident men (0.29-0.43, 95% CI) and 41% in non-resident women (0.34-0.48, 95% CI). Prevalence in non-resident men reached a plateau of 46 to 47% at ages 25 through 34, and peaked at 55% in the oldest age group. In non-resident women, prevalence reached at an extraordinarily high peak of 66% in women ages 25 to 29.

Tables 4.1 and 4.2 shows key characteristics of the population of 12,098 eligible individuals who participated in HIV testing and were *not* part of the non-resident sample. Of these individuals, 11,779 were retrospectively seen, with updated data, to have been residents on 01 June 2003. However, 418 of these individuals were seen retrospectively to have been non-residents on that date, and participated in testing though they were not included in the non-resident sample.

Table 4.1 shows the distribution of migration and mobility patterns and their associations with HIV-infection status in the (non-sampled) populations of men and women, respectively. Unweighted frequencies, weighted row percentages and the findings of simple logistic regression models of the age-adjusted odds of HIV infection

risk are shown for each category of migration in men and women. As shown, levels of HIV infection overall are higher among women than among men, and in each migration category, HIV prevalence is higher among those more mobile compared to those more residentially stable. In men, 24.5% of those who ever migrated vs. 18.4% who maintained a stable residence since the start of the DSS were HIV-positive, while in women, 42% of migrants vs. 28.7% of non-migrants were HIV-positive. Men who migrated had 77% higher odds, and women almost double the odds of HIV infection (OR=1.90) compared to their counterparts who did not. Of the patterns of migration since 2000, HIV prevalence was highest among those who had migrated out of the area at least once: 31.1% of men and 48.5% of women who out-migrated (vs. 19.2% of men and 32.2% of women who did not) were HIV-positive. The number of migrations sine 2000 had a clear positive, dose-response relationship with HIV infection risk for women, but not for men: in men, the highest level of infection was seen in men who had migrated once (25.4%, OR=1.90 relative to non-migrants) while in women it was seen in those who had migrated two or more times (45.3%; OR= 2.08 relative to non-migrants.) Table 4.1 also shows a measure of distinct, mutually exclusive migration flows, confirming that out-migration only, leading to non-resident membership in the household, presented the highest level of risk for men (37.2%, OR=3.64) and women (52.8%; OR=2.83), followed by out-migration and in-migration (a flow in either direction). Finally, as suggested by the analyses of prevalence data for non-residents shown in Figure 4.2, non-resident status strongly predicted HIV infection in this population. Male and female non-residents had an approximately 60% higher odds of HIV infection relative to their counterparts who were resident members of households.

The second page of Table 4.1 shows measures of migration and mobility in the more recent past, including migrations in the two years prior to June 2003, and presence in the household in the six months prior to the most recent visit. The more recent measures captured similar levels of infection risk compared to the longer-term measures of migration. Importantly, a measure of short-term mobility, the pattern of absence from the household in the past 6 months, shows a clear, positive, dose-response relationship to prevalent HIV infection: those who had spent few or no nights in the home in the DSA had the highest level of infection (44% and OR=3.64 in men, and 47.3% and OR=2.41 in women, relative to those who had been home every night).

Table 4.2 shows other socio-economic and behavioral characteristics among men and women, respectively, and their associations with prevalent HIV infection in the populations. As shown, the HIV/AIDS epidemic has hit young adults particularly hard: a full 40.7% of men and 52.2% of women aged 25 to 34 were found to be HIV-positive. While the odds of infection rise most dramatically for males by ten-year age increment (with a nine-fold increase for those in the 25 to 34 age group compared to the youngest one), this belies a startling sex disparity in risk in those aged 15 to 24: 6.8% of young men versus a full 26.2% of young women were HIV-positive. Those with a current non-marital partner were also at highest risk of infection: while overall levels of infection were higher for women (45.1%) than men (35.3%) in this category, the odds of infection were higher for men (OR=6.67) than they were for women (OR=3.81) relative to their respective married counterparts. Employment was not associated with HIV infection for men, but conferred a 26% higher HIV infection risk for women, but education level was

not associated with risk for either women or men, other than the decreased risk of infection among full-time students relative to those with little or no education.

Continuing to household infrastructure measures, higher levels of prevalent HIV were seen in those with access to better infrastructure, a marker of urbanity and proximity to major corridors of transportation. Relative to their counterparts whose homes were not connected to grid or generator electricity, men had 80% higher odds of HIV and women had 60% higher odds of infection. For women but not men, access to piped water and to a flush or chemical toilet also was associated with heightened HIV risk relative to those without such infrastructure. Among men who later died before January 2007, 72.4% had been HIV-positive, and among women that figure was 86.9%, reflected women's higher overall level of prevalence. For women but not men, having mourned the loss of another adult member of the household to AIDS was significantly associated with an elevated HIV risk (OR=1.41).

Finally, sexual behaviors by HIV infection status are shown for the populations of men and women. As shown, ever having used a condom was a marker of HIV infection risk not in men, but in women. But feeling that one was at risk of HIV in the past or at present was predictive of HIV infection for both men (OR= 3.18) and women (OR=1.56). Having previously received voluntary counseling and testing for HIV also predicted elevated risk for women (who typically receive it in the context of prenatal visits) but not men. Overall, 11.3% of men and 18.9% of women had obtained HIV-VCT prior to the HIV surveillance visit (not shown). In both men and women, those who were HIV-positive reported a statistically significantly higher number of sexual partners than those who were HIV-negative, yet the incremental increase in numbers of partners conferred a

particularly heightened risk for women. Each additional lifetime partner increased the age-adjusted odds of infection by 3% for men and 87% for women; for past year partners the age-adjusted odds increased by 19% for men and 2.5 times for women. Each additional current partner increased the odds of infection by 30% for men and doubled the odds of HIV infection for women.

Table 4.3 provides a summary of the characteristics of the population of sampled non-residents who participated in HIV testing. Small numbers in many of the categories for the characteristics render some estimates less stable and hamper our ability to discern associations with HIV infection. Yet the table renders an impression of the characteristics associated with HIV for the non-resident population. In review, levels of HIV prevalence among non-residents were higher than among residents, across sex and age groupings; as shown in Table 4.3, additional mobility among the non-residents conferred no heightening of their already high levels of HIV prevalence. As described in the previous chapter, non-residents tend to be younger, and were less likely to be married and more likely to be employed; yet with the exception of age grouping, an association between these characteristics (and others not shown here) and HIV infection was not detected. A significantly higher mean number of sexual partners over the lifetime, in the past year, and concurrently, was seen in HIV-positive compared to HIV-negative resident women, but not men. The higher risk sexual behavior reported by HIV-positive non-residents finds a parallel in the higher risk behaviors reported by migrants of both sexes (relative to non-migrants), detailed in Table 4.4.

Table 4.4 returns to the non-sampled population of individuals who were eligible for HIV testing on 01 June 2003 (n=46,456), and uses no HIV test data, but rather

describes the reported sexual behavior of migrants and non-migrants within the eligible population. For this table, migration was defined as having migrated at least once (in-, out- or internally) since the start of the DSS. Data are shown for the 5,901 men and 11,293 women who participated in the first round of sexual behavior surveys which were conducted at approximately the same time period as the first round of HIV surveillance. T-tests of the differences in mean numbers reported by migrants and non-migrants were carried out in men and women, respectively, assuming unequal variances and a 95% confidence level; chi-square tests were used to test group differences in the categorical variables. As shown, and confirming prior research, men overall reported higher numbers of sexual partners than did women; they were more likely to have ever used a condom; and they were less likely to have ever received voluntary testing and counseling for HIV (HIV-VCT). Among both men and women, migrants reported a significantly higher mean number of lifetime, past year and current partners compared to non-migrants. These findings are graphically displayed as well, in Figure 4.3. Migrants of both sexes were more likely than their non-migrant counterparts to have ever used a condom, to feel that they were at risk of HIV in the past or at present, and to have previously obtained HIV-VCT.

Multiple logistic regression models of HIV infection risk. The remaining tables show the results of a set of multiple logistic regression models carried out to test the study's hypotheses. The models were conducted using data for the non-sampled population who participated in testing (n=12,098), and to enhance the likelihood of detecting clear differences between migrant and non-migrant groups, the data are further restricted to the n=11,677 individuals who are known to have been resident members of

households on the eligibility date.

Table 4.5 shows the findings of additive effects models of the HIV infection risk associated with sex and migration, independently and net of the effects of covariates which may mark a "predisposition" to HIV infection as well as to migration (note that the same set of covariates is used in all of the multiple logistic regression models). On the basis of the findings of the logistic regression modeling shown in Table 4.1, I selected three variables for migration and mobility, in sequence, to examine whether observed associations with prevalent HIV infection vary by the way in which migration and mobility are measured, and whether certain measures are more sensitive for detection of an association with HIV. These are: A) a dichotomous measure of at least one vs. no migration in the past two years, B) a continuous variable for the frequency of migration in the past two years (i.e. the sum of migrations), and C) a four-category measure of the degree of absence from the home in the past six months. Model A shows that, net of the effects of all covariates, those who had migrated at least once in the past two years had a 28% higher odds of HIV infection relative to those with a stable residence in the past two years. Model B shows that independent of all other effects, each step increase in the number of migrations in the past two years conferred a 24% higher odds of HIV infection. Model C demonstrates that one's degree of absence from the household in the DSA in the past six months was positively associated with HIV infection risk. Relative to those who spent every night at home in the past six months, those present most nights had a 18% higher odds, and those who spent approximately half or fewer of the nights at home had a 53% higher odds of being HIV-positive (OR=1.53).

The odds ratios for the covariates in models A through C did not differ markedly

across the models. Across all models, women had almost double the odds of HIV infection relative to men, net of the effects of migration and the other independent variables (OR=1.97 and 1.96 for models A-C). For the sake of parsimony I summarize here the remaining key findings for model A: the odds of infection were highest in age group 25 to 34 (OR=2.73), relative to the youngest age group; odds of infection peaked in that 10-year group and declined with age thereafter. Across all models, those who achieved Matric or higher level of education had 25% lower odds of infection and those who were current students, 60% lower odds, relative to those with five or fewer years of formal education.

Those with a source of earned income had a 15% higher odds of infection compared to those with no earned income source. Of the household infrastructure variables shown in Table 4.1, only having access to grid or generator electricity was selected for inclusion in the multivariate models, as electricity, piped water and toilet access were highly inter-correlated, and electricity was most sensitive for the prediction of HIV prevalence. Relative to those without an electricity source, those with household electricity had a 54% higher odds of being HIV-positive. As suggested in the descriptive analyses, being married was quite protective against HIV infection: relative to those with a current marital partner, those with no partner had 63% higher odds (OR=1.63) and those with a non-marital partner (whether regular or casual) had almost three times the odds of HIV infection (OR=2.91). In the multivariate models, having mourned the death of another adult household member to AIDS prior to June 2003 was not associated with one's own odds of infection, and this variable is not included in the multivariate models..

In summary, the analyses thus far confirmed the first two hypotheses to be tested

in this study: the odds of HIV infection are higher among women than among men, net of the effects of all observable factors that predict infection in this population; and the odds of HIV infection are higher among those who migrate relative to those who do not, net of the effects of sex and other covariates. The next step in this analysis was to determine whether sex differences in HIV infection rates can be partially explained by sex differences in migration patterns. To test the third hypothesis, that the odds of HIV infection are higher for female migrants than for male migrants (and non-migrants of both sexes), I repeated the logistic regression models A through C shown in Table 4.5, but added an interaction term of sex *x* migration to each of the three models. The sex* migration interaction term was significant for measures of migration in the past two years and frequency of migration in the same period, and not significant for the measure of mobility in the past six months. For the sake of parsimony I selected the dichotomous recent migration measure for model 2), shown in Table 4.6, which tested the interaction of sex by migration in predicting HIV infection risk.

Test of the migration x sex interaction for the prediction of HIV infection. In Table 4.6, I show findings of the multiplicative effects model. This was carried out using the 'xi' command in Stata and dummy coding ('i.*migration**i.*sex*') which automatically drops the main effects of sex and migration in the model, and compares multiplicative effects of migration*sex on HIV to the omitted category of male non-migrants. As displayed in the table, a key hypothesis of this study— that migration confers a higher risk of HIV infection for women than it does for men— was confirmed. For men, having migrated at least once in the past two years was not significantly associated with HIV infection. Yet female non-migrants had a 72% higher odds of infection compared to male

non-migrants, and female migrants had more than double the odds of HIV infection (OR=2.56) compared to male non-migrants. In sum, sex does modify the effect of migration on HIV infection risk: women's involvement in migration exacerbates their disproportionate HIV infection risk relative to men. The effects of the other covariates on HIV remained stable in this model and were quite similar those seen in Table 4.5.

Given that this key hypothesis was confirmed, I proceeded with an analysis to ascertain whether the sex composition of 'recent migrants' could account for the effect seen in Model 2; i.e., I test hypothesis 3.a) *Composition: the HIV risk associated with migration differs for men and women because women are more likely than men to migrate.* I produced a simulated HIV prevalence level for male recent migrants and compared it to the observed prevalence. I forced an 'equality' of migration effect on the distribution of male migrants vs. non-migrants using women's migration-associated HIV risk (derived from the OR for women). This exercise is shown in Table 4.7. Were the simulated and actual prevalence levels similar, we would conclude that the finding shown in Model 2 is at least in part due to the sex composition of the population of recent migrants. However, as shown, they were quite different: were men to have the same migration 'effect' as women, the HIV prevalence among male migrants would be 32.8% rather than the 19.8% observed. The population of recent migrants and of recent non-migrants is approximately 40% male, and sex composition cannot account for the finding that recent migration presents a greater odds of infection for women than men.

Therefore I proceed with testing hypothesis 3.b), t*he behavioral consequences of the decision to migrate vary by sex.* Note that in Table 4.4 (and Figure 4.3), the sexual behavior of migrants and non-migrants were compared for the total population and in the

sub-populations of men and women; t-tests and chi-squared tests were used to test the hypothesis that differences between migrants and non-migrants were not equal to null. In the pooled analyses and in women and men, migrants reported higher risk behaviors than non-migrants. But a statistical sex comparison was not undertaken at that stage. It was apparent that men, whether migrant or non-migrant, still reported higher risk sexual behavior than women: they had a higher mean number of lifetime, past year and concurrent partners. To confirm the apparent finding that male migrants and non-migrants report higher risk behavior than female migrants and non-migrants, I carried out t-tests of sex differences in the numbers of partners reported, within the sub-populations of migrants and non-migrants, respectively. Within both migration categories, men reported significantly higher risk behavior (these findings are not shown.) In sum, hypothesis 3.b) was not supported by the findings: female migrants do not report higher risk behavior than do male migrants (although they certainly reported higher risk behavior than female non-migrants.) The possibility remained, however, that a given level of sexual risk behavior could pose a greater hazard of HIV infection to female migrants than to male migrants (or non-migrants of either sex), if hypotheses 3.c) were true, that female migrants travel to higher prevalence destinations and are exposed to higher-risk sexual networks than are male migrants, or if some other unmeasured aspect of the migration experience rendered its 'behavioral consequences' more hazardous for women. Thus I undertook further modeling to explore the role of sexual behavior in distinguishing the HIV risks of male and female migrants and non-migrants.

Shown in Table 4.8 are the findings of an additive effects and a multiplicative model, incorporating measures of sexual risk behavior for the prediction of HIV infection

risk. Model 3 tests the hypothesis that migration, sex and higher risk sexual behavior independently predict HIV infection. This model was carried out essentially to establish whether measures of higher risk sexual behavior are sensitive for the prediction of HIV infection risk, net of the effects of migration, sex and all other covariates; if they were not, further modeling of interactions would not have been warranted. For the models in Table 4.8, I selected the measure of at least one versus no migrations in the past two years prior to the HIV test, and include a measure of perceived risk of HIV in the past or at present. (Measures of condom use and of previous HIV-VCT were inter-correlated and poorly predictive of HIV infection in multivariate models, and therefore were not included.) In Model 3, I include measures of the reported number of sexual partners over the lifetime and in the past year as independent variables. As shown, women had 2.6 times the odds of men, and those who had migrated in the past two years had a 25% higher odds of being HIV-infected. Each additional lifetime partner conferred a 3% increase, and each additional past year partner an 11% increase in the odds of infection, net of the effects of all other predictors. Perceived risk of HIV was associated with actual risk: those who felt they may have been exposed to the virus indeed had a 36% higher odds of being HIV-positive.

Next, I tested, but did not show here, the additive (independent) effect of high risk sexual behavior, with the interaction of sex and migration. This was necessary to determine whether the interaction between migration and sex was partly explained by behavioral risk differences. If when behavioral risk terms were added (to model 2), the interaction term (migration *x* sex) were to lose significance, then we may conclude that this was likely. The interaction term did not, however, lose significance. Thus I fitted

Model 4, which tested the three-way interaction of sex, migration and behavioral risk for the prediction of HIV prevalence. This model tests the hypothesis that migration pattern and sexual behavior are inter-related in the prediction of differential levels of HIV risk for men and women. I selected the reported number of sexual partners over the lifetime as the behavioral risk indicator, though when the same model was carried out using the reported number of partners in the past year, results were similar. The three-way interaction was carried out using the 'xi3' command in Stata, which permits three-way interactions for any combination of continuous and categorical variables. I used, again, dummy coding with the 'i' prefix ('i.*migration**i.*sex***lifetime partners*'), which automatically dropped the main effects of sex, migration and the number of partners from the model, and compares the effect (on HIV risk) of the lifetime number of partners for each migration-by-sex category to the omitted category of male non-migrants. Odds ratios for the interaction term components were constructed from logit model coefficients (the procedure is elaborated in this note.[viii])

As shown, for male non-migrants, each additional lifetime partner conferred a 4% increase in the odds of HIV infection; for male migrants, each additional lifetime number of partners was not significantly associated with HIV infection. In other words, there was no difference between male migrants and non-migrants in the effect that an additional partner had on their risk of HIV infection. For female non-migrants, each additional lifetime partner conferred a 24% increase in the odds of infection, while for female migrants each additional partner increased the odds of infection by almost 50% (OR=1.49). The p-value for the interaction term coefficient in the logit specification of the model was 0.022, warranting confidence in the findings and their display here. The

finding suggests that the influence of higher risk sexual behavior (as measured here by the reported number of partners over the lifetime) on prevalent HIV infection is modified both by sex and by participation in migration, net of the effects of other factors that predict infection.

Finally, I also examined the interaction between sexual risk behavior and migration for the prediction of HIV infection risk in women alone. In contrast to the full models discussed above, in this model the reference category would be female non-migrants, and the interaction term effect represented the HIV risk associated with each additional partner for female migrants. This was to rule out the possibility that women's biological vulnerability alone could account for female migrants' greater risk of HIV infection relative to male non-migrants. The interaction term was marginally significant (p= .06), providing additional support for the notion that higher risk sexual behavior poses a greater risk to women in the context of migration than apart from it.

In summary, the findings support a key hypothesis of this study that the behavioral consequences of migration, for HIV risk, are disadvantageous to women. However, this is not due to any greater risk behavior on the part of female migrants relative to their male counterparts; rather, higher risk behavior *in combination with* migration places women at higher risk than men of acquiring HIV. Among both migrants and non-migrants, if risk behavior is held constant, women are at greater risk of acquiring HIV infection than are than men subjected to the same level of 'exposure'. This is not surprising given the greater transmissibility of the virus from male to female bodies. Previous analyses in this chapter showed that sexual risk behavior strongly predicted HIV infection risk for men and women, and that migrants of both sexes

engaged in higher risk behavior than non-migrants. The hypothesis that migration is associated with higher risk sexual behavior was supported; although the hypothesis that female migrants engage in riskier sex than male migrants was not. The findings in Model 4, however, further extend our understanding of the role of sexual behavior in producing higher infection rates in female than in male migrants: for a given level of risk behavior, female migrants are at a higher risk than female non-migrants, as well as male migrants and non-migrants.

Analysis of the migration patterns associated with incidence. A limitation of this study was that although the independent variables used in its substantive models are valid for the time period preceding the HIV test date, the study is cross-sectional and uses prevalent HIV infection as the dependent variable. In other words, although the data were constructed to maximize the likelihood of achieving temporal consistency, is not possible to know whether the independent variables, chiefly migration, preceded infection. A full study of the patterns of migration associated with HIV incidence is underway, and cannot be undertaken here. However, a simple analysis to compare the migration patterns of those who did and did not HIV sero-convert between the first and the second rounds of HIV surveillance was possible, and the findings of this confirmatory analysis are shown in Tables 4.9 and 4.10. There were 4,155 individuals who were members of households in the DSA on 01 June 2003 and eligible for testing on that date, and who tested HIV-negative in the first round of surveillance, and who also participated in the second round of surveillance. Of these individuals, 192 HIV sero-converted, corresponding to an incidence of 4.6% for the period between rounds. The incidence rate for men was 3.5% and for women, 5.8%. Table 4.9 shows the distribution of patterns of migration which

occurred after the first HIV test date and before the second HIV test date for the total population and for men and women, respectively, by sero-conversion group. As shown, any migration, and the sum of migrations, was significantly associated with HIV sero-conversion between rounds in the total population, but this was due to the importance of migration for predicting incidence in women. The highest HIV incidence estimate, at 13.2%, is observed in women who had migrated at least once between the two rounds of HIV surveillance. Estimates of the association between incidence and the number of migrations using the pooled data were suggestive of a positive dose-response relationship.

Table 4.10 shows the findings of a multiple logistic regression model of the factors associated with HIV incidence. As the model uses unweighted data and few independent variables as controls, the findings should be interpreted with caution. However, the main findings of the cross-sectional analyses, that migration was strongly associated with HIV prevalence, are mirrored here. Net of the effects of other covariates, having migrated within the period resulted in 2.5 times the odds of sero-converting, relative to not having done so; those who migrated once had 2.4 the odds, and those who migrated two or more times had nearly triple the odds of sero-converting (OR=2.87) relative to those who were residentially stable. A test of an interaction between migration and sex for the prediction of incidence yielded an insignificant interaction term; possibly the number of sero-converters within each sub-population were too small to detect sex differences in the effect of migration on HIV incidence. This test should be repeated using pooled incidence data from several rounds of surveillance, with a full set of control variables, and with an adjustment for selection bias in testing, before one can state definitive conclusions regarding the role of migration in HIV incidence in men and

women in this population.

Discussion. This study has addressed a large gap in the research on migration, gender and HIV/AIDS in southern Africa. The findings of this research underscore that women in the region are not the static, passive recipients of HIV infection from male migrants. As shown in previous chapters, women are participating fully in migration processes in the region, and this chapter shows that, unfortunately, they are also fully experiencing the burden of HIV/AIDS which migration so often confers. Migration appears to enhance women's already high risk of infection, and the sex comparisons undertaken in this chapter suggest that the circumstances surrounding migration present a higher HIV risk to women than to men.

The key findings of the study were that migration confers a higher risk to women than it does to men, and that higher risk sexual behavior, in the context of migration, appears to affect HIV risk for men and women differently: while a given level of sexual risk behavior is more likely to result in infection for women than for men, this is especially the case for women involved in migration. These findings point to the possibility that female migrants travel to 'higher risk environments', destinations higher in prevalence than the common destinations of male migrants, where unprotected sex is much more likely to result in infection. It is also possible that female migrants in this study under-reported their sexual risk behavior; but the magnitude of that under-reporting would have to be great to account for the findings shown here. More detailed studies are needed to elucidate the factors that render migration particularly hazardous for women, and also to explore possibilities for HIV prevention interventions for female migrants. As female migration has become an essential household livelihood strategy in KwaZulu-

Natal (KZN), such efforts are essential to preserve and enhance the beneficial aspects of migration for women and their families, and to stave off its most dire consequence.

Analysis of the reported number of concurrent sexual partners used in this study showed that a small number of individuals reported more than one current sexual partner in this population; somewhat higher numbers of past year partners were reported. While social desirability bias may have affected the estimates shown here, important for this analysis was the finding that migrants had more partners than non-migrants, and this played a role in their greater likelihood of being HIV-positive. Concurrency may not always be a sensitive marker of individual-level infection risk, but at population-level, and particularly for studies of migration and HIV/AIDS, it is an important marker of the degree to which HIV/AIDS is likely to be fueled and sustained in the population. Migrants may be important 'links' to geographically-spread sexual networks, and those who travel frequently and to several destinations especially may unwittingly play a role in connecting diverse sexual networks. The greater the inter-connectedness among sexual networks, the more quickly and broadly HIV may circulate within the population. Studies of migration and HIV/AIDS have traditionally pointed to male migrants as the 'transmitters' of HIV in southern African populations: whether or not this was true earlier in the epidemic, it is no longer the case. I would argue that it is no coincidence that the sustained high levels of HIV prevalence have been observed in this population along with sustained, high levels of mobility. Moreover, this study has supported the hypothesis that the striking sex disparity in HIV prevalence seen in this population *is* in part due to the particularly high risk of HIV faced by female migrants, who, in a context of declining

marriage and increasing unemployment, comprise a large and possibly increasing proportion of adult women in KZN.

This study was subject to several limitations. A primary concern would be that migration may be endogenous to HIV infection. That is, HIV infection may in a recursive manner predict migration, if those who are infected may be more likely to migrate in order, for example, to return home to receive care-giving. One possibility for addressing this problem would be to use an 'instrumental variables' approach (as described by Johnston and DiNardo, 1997) to correct for the inflated estimated coefficients that would result from the endogeneity of migration (this measurement error would, in effect, exaggerate the impact of migration on HIV infection risk.) The issue for this study is that it is very difficult to identify an appropriate instrument for migration, i.e. a variable that predicts migration but is entirely uncorrelated with HIV infection. The likeliest "candidates", for example the presence of a pensioner/child-care provider in the household, levels of household or community infrastructure, or labor market-related factors, would in the South African context (with its endemic level of HIV/AIDS) also be associated with the outcome measure. To examine this problem, I carried out the main substantive models shown in this chapter including, at first, those died in the period after the HIV test and behavioral data were collected; I then carried out the analyses with these individuals excluded, and examined the magnitude and direction of the change in estimates values of the coefficients for migration. From this exercise, I observed no change in the direction of the estimates, and the values of the coefficients for migration were very slightly higher. From this I conclude that migration was primarily exogenous

to HIV infection in this population.

Another concern, with the cross-sectional design of this study, would be the potential for omitted variable bias in the measure of associations between migration and HIV; as mentioned, I have to the extent possible controlled for this bias by including all available variables which captured a 'risk predisposition', predicting both migration and HIV. Analyses of the sexual behavioral risks associated with HIV infection are subject to a host of limitations, and social desirability bias may affect estimates differently for men and women due to the gendered social norms regarding sexuality and communication (women may tend to under-report their numbers of sexual partners, while men may over-report them.) Incomplete data and systematic item non-response can challenge any study's validity, and the sexual behavior data available for this analysis was by no means complete. While this issue may be particularly serious for social epidemiological studies of levels of risk behavior within a population, this study was primarily concerned with estimating migrant vs. non-migrant group differences in these reported behaviors. While comparisons of reported risk behaviors by *sex* may be particularly subject to bias, I do not anticipate that migrants would be any more or less likely than non-migrants to systematically over-report or under-report risk behavior. That is, any bias in reported behavior due to sex differences in reporting would apply equally to migrants and non-migrants.

Finally, I anticipated the potential for sample selection bias in the outcome measure. As previously mentioned, participation in HIV testing was not universal in the population, and there were non-random differences in the characteristics of those who did and did not consent to HIV testing. I corrected for selection bias on the basis of the

observable covariates of HIV testing using the Propensity Score weighting approach. Despite its utility, there are limitations to the Propensity Score weighting methods. While this method adjusts for selection bias on the basis of observed covariates, it cannot adjust for unobserved ones. “This is always a limitation of nonrandomized studies compared to randomized studies, where the randomization tends to balance the distribution of all covariates, observed and unobserved” (Rubin, 1997).

These limitations notwithstanding, the findings of this study have important implications for HIV prevention and care in KwaZulu-Natal. A range of measures of mobility were associated with HIV infection, not only the long-distance, long-term measures often used in migration studies. HIV prevention interventions, including enhanced counseling and testing, therefore should not focus solely on workplace-based programs for stable labor migrants, and indeed, interventions based upon an ‘identity’ of ‘migrant’ would chase a moving target, as the population overall is highly mobile, yet patterns of mobility vary by sex and life stage. Place-based HIV-prevention interventions that ‘catch’ temporary migrants, small-scale-traders and work-seekers at their main migration destinations, may hold more promise for stemming the transmission of HIV in the population. The social networks of migrants, so important for establishing footholds and economic opportunities in new places, may also provide avenues for the transmission of HIV prevention messages and mutual assistance with remaining HIV-negative or accessing HIV/AIDS testing and care. The bottom line: this research points to an urgent need for HIV prevention efforts in a population ravaged by HIV/AIDS, and highlights the particular vulnerability of migrants in the population, especially female migrants, to HIV/AIDS.

Table 4.1: Migration and mobility characteristics of the population by HIV infection status (All age-eligible participants in testing, who were members of households on 01 June 2003*)

Migration and Mobility Characteristic	MEN							WOMEN						
	HIV-		HIV+		Age-adj.			HIV-		HIV+		Age-adj.		
	n	%	n	%	OR	95%	CI	n	%	n	%	OR	95%	CI
Since 01 Jan. 2000 (DSS Start)														
Stable residence	3,099	81.6	441	18.4	1.00			3,718	71.3	1,181	28.7	1.00		
Any migration (in-, out- or internal migration)	1,155	75.5	255	24.5	**1.77**	**1.25**	**2.51**	1,458	58.0	791	42.0	**1.90**	**1.56**	**2.31**
No external in-migration	3,745	79.6	564	20.4	1.00			4,559	67.5	1,614	32.5	1.00		
Any external in-migration	509	77.3	132	22.7	1.28	0.90	1.83	617	57.5	358	42.5	**1.62**	**1.25**	**2.09**
No internal migration	3,882	79.0	633	21.0	1.00			4,645	66.0	1,690	34.0	1.00		
Any internal migration	372	80.5	63	19.5	1.09	0.63	1.89	531	62.2	282	37.8	1.22	0.94	1.59
No external out-migration	4,073	80.8	643	19.2	1.00			4,953	67.7	1,840	32.3	1.00		
Any external out-migration	181	68.9	53	31.1	**2.51**	**1.47**	**4.29**	213	51.5	132	48.5	**2.06**	**1.42**	**2.99**
Frequency of migration														
Stable residence	3,341	81.3	490	18.7	1.00			4,020	70.1	1,324	29.9	1.00		
1 migration since DSS start	736	74.6	160	25.4	**1.90**	**1.27**	**2.84**	900	59.1	504	40.9	**1.75**	**1.40**	**2.18**
≥ 2 migrations since DSS start	177	76.9	46	23.1	**1.73**	**1.01**	**2.94**	256	54.8	144	45.3	**2.08**	**1.42**	**3.04**
Migration flow														
No migration since DSS start	3,341	81.3	490	18.7	1.00			4,020	70.1	1,324	29.9	1.00		
Internal migration only	383	79.7	92	20.3	1.27	0.88	1.84	449	60.6	258	39.4	**1.66**	**1.29**	**2.12**
External out-migration only	58	62.8	17	37.2	**3.64**	**1.63**	**8.11**	50	47.2	34	52.8	**2.83**	**1.56**	**5.12**
External in-migration only	334	79.1	56	20.9	1.51	0.83	2.75	464	63.3	241	36.7	**1.45**	**1.12**	**1.88**
External out & in-migration only (either direction)	100	71.3	34	28.7	**2.44**	**1.33**	**4.47**	126	51.0	74	49.0	**2.41**	**1.45**	**4.01**
Other flows**	38	88.7	7	11.4	0.78	0.29	2.10	67	58.5	41	41.5	1.78	0.87	3.64

Table 4.1 continued on next page

Table 4.1, continued:

Migration and Mobility Characteristic	MEN							WOMEN						
	HIV-		HIV+		Age-adj.			HIV-		HIV+		Age-adj.		
	n	%	n	%	OR	95%	CI	n	%	n	%	OR	95%	CI
2 years prior to 01 June 2003														
Stable residence in past 2 years	3,313	81.1	493	18.9	1.00			3,999	70.5	1,321	29.5	1.00		
Recent migration (in-, out- or internal, past 2 yrs)	941	75.6	203	24.4	**1.71**	**1.20**	**2.45**	1,177	57.2	651	42.8	**1.88**	**1.53**	**2.31**
No external in-migration	3,847	79.2	95	20.8	1.00			4,696	66.8	1,691	33.3	1.00		
Any external in-migration	407	78.9	101	21.1	1.15	0.79	1.66	480	58.7	281	41.3	**1.51**	**1.15**	**1.99**
No internal migration	,977	79.0	652	21.1	1.00			4,783	66.1	1,753	34.0	1.00		
Any internal migration	277	81.2	44	18.8	1.03	0.52	2.02	393	60.9	219	39.1	1.29	0.95	1.75
No external out-migration	4,097	80.9	48	19.1	1.00			4,998	67.6	1,863	32.4	1.00		
Any external out-migration	157	67.9	48	32.2	**2.67**	**1.55**	**4.62**	178	51.0	109	49.0	**2.09**	**1.41**	**3.10**
Frequency of recent migration:														
Stable residence	3,517	80.9	535	19.2	1.00			4,266	69.3	1,453	30.7			
1 migration, past 2 years	612	74.4	129	25.6	**1.85**	**1.21**	**2.83**	747	58.6	415	41.4	**1.71**	**1.35**	**2.17**
2 or more migrations, past 2 years	125	78.4	32	21.6	**1.54**	**0.86**	**2.78**	163	54.1	104	45.9	**2.05**	**1.31**	**3.22**
Short-term mobility														
Household presence, past 6 months†														
Every night	2,612	85.0	352	15.0	1.00			2,991	72.3	933	27.7	1.00		
Most nights	1,423	78.0	300	22.0	**1.62**	**1.28**	**2.04**	1,874	62.9	877	37.1	**1.55**	**1.36**	**1.77**
Approximately half	171	77.9	32	22.1	**2.01**	**1.10**	**3.68**	239	60.0	125	40.0	**1.88**	**1.34**	**2.65**
Few or no nights	48	56.1	12	44.0	**3.64**	**1.45**	**9.15**	72	52.7	37	47.3	**2.41**	**1.39**	**4.18**
Residency status Non-resident*	147	66.5	36	33.5				139	49.7	99	50.3			
Resident on 01 June 2003	4,107	82.1	660	17.9	**0.43**	**0.23**	**0.79**	5,037	68.6	1,873	31.4	**0.44**	**0.30**	**0.65**

Table 4.1 notes: Unweighted frequencies and weighted percentages shown. Percentages are row percentages (showing the percentages HIV+ vs. HIV- within each category in men and women, respectively.) Weights are propensity score weights based upon probability of participation in HIV testing based on

observable predictors of testing. Results of logistic regression models that are statistically significant at $p < .05$ are highlighted in bold print.
* These data are shown for the population eligible for HIV testing on 01 June 2003, who WERE NOT included in the non-resident sample selected for participation in testing at that time. Of the n=44,648 individuals not in the non-resident sample, n=29,761 (66.7%) were retrospectively determined to have been resident members on 01 June 2003, and n=12,098 participated in testing. The n=1,808 individuals in the non-resident sample, of whom n=530 participated in testing, were excluded from analysis shown in Table 1, but are described in Table 3.
** Includes: In- & internal migration only (either direction), Out- & internal migration only (either direction), and In-, out- & internal migration. All categories for this variable are mutually-exclusive.
† Prior to the HIV surveillance visit.

Table 4.2: Other socio-economic and behavioral characteristics of the population by HIV infection status (All age-eligible participants in testing, who were members of households on 01 June 2003*)

Characteristic	MEN							WOMEN						
	HIV-		HIV+		Age-adj.			HIV-		HIV+		Age-adj.		
	n	%	n	%	OR	95%	CI	n	%	n	%	OR	95%	CI
Age group (10-year)**														
15-24	2,968	93.2	130	6.8	1.00			2,875	73.8	702	26.2	1.00		
25-34	469	59.3	284	40.7	**9.43**	**6.05**	**14.70**	732	47.8	698	52.2	**3.07**	**2.42**	**3.90**
35-44	391	65.0	175	35.0	**7.40**	**4.57**	**12.00**	1,035	66.0	434	34.0	**1.45**	**1.12**	**1.88**
45-54 men/45-49 women†	426	63.6	107	36.4	**7.85**	**3.02**	**20.43**	534	77.8	138	22.2	0.80	0.62	1.03
Partnership pattern														
Marital partner	358	82.6	85	17.4	1.00			953	78.1	218	21.9	1.00		
No current partner	2,516	90.6	140	9.4	**2.52**	**1.20**	**5.30**	1,936	78.4	396	21.6	**1.45**	**1.04**	**2.02**
Non-marital partner††	1,147	64.7	459	35.3	**6.67**	**3.84**	**11.58**	2,056	54.9	1,314	45.1	**3.81**	**2.82**	**5.14**
Missing	233	85.0	12	15.0	**3.79**	**1.47**	**9.82**	231	78.1	44	21.9	1.45	0.86	2.45
Employment														
No earned income	1,907	79.5	347	20.5	1.00			2,659	63.8	1,222	36.2	1.00		
Does something to earn money	715	70.0	288	30.0	1.09	0.75	1.58	944	57.7	517	42.3	**1.26**	**1.00**	**1.61**
Refused, missing or NA	1,632	86.3	61	13.7	0.84	0.38	1.86	1,573	78.0	233	22.0	**0.51**	**0.38**	**0.70**
Education level														
None through Standard 5	973	69.2	327	30.8	1.00			1,650	60.9	757	39.2	1.00		
Standard 6 to 9	615	73.4	186	26.6	1.07	0.68	1.68	979	59.8	594	40.2	0.96	0.75	1.23
Standard 10 (Matric) or higher	427	77.3	108	22.7	0.97	0.58	1.63	563	60.4	296	39.6	0.93	0.69	1.25
Full-time student	2,066	98.1	31	1.9	**0.10**	**0.05**	**0.21**	1,789	87.3	225	12.7	**0.19**	**0.14**	**0.26**
Missing	173	64.7	44	35.3	1.50	0.60	3.78	195	59.8	100	40.2	0.96	0.64	1.45

Table 4.2 continued on next page

Table 4.2, continued:

Characteristic	MEN HIV- n	%	HIV+ n	%	Age-adj. OR	95%	CI	WOMEN HIV- n	%	HIV+ n	%	Age-adj. OR	95%	CI
Household infrastructure														
No electricity	2,027	85.4	254	14.6	1.00			2,699	71.5	823	28.5	1.00		
Has electricity source	2,014	77.5	393	22.5	**1.81**	**1.29**	**2.54**	2,235	60.9	1,030	39.1	**1.59**	**1.31**	**1.94**
Missing	213	65.1	49	34.9	**2.68**	**1.27**	**5.64**	242	60.4	119	39.6	**1.66**	**1.13**	**2.45**
Other water source	2,073	82.3	304	17.7	1.00			2,561	68.9	873	31.1	1.00		
Piped water (private/public)	1,998	79.7	348	20.3	1.30	0.94	1.80	2,411	63.4	995	36.6	**1.27**	**1.05**	**1.54**
Missing	183	64.9	44	35.1	**2.13**	**1.01**	**4.51**	204	59.9	104	40.1	**1.51**	**1.01**	**2.25**
No flush or chemical toilet	2,906	82.4	446	17.6	1.00			3,661	67.4	1,273	32.6	1.00		
Flush toilet/VIP	1,163	77.9	204	22.1	1.43	0.99	2.07	1,308	62.9	593	37.1	**1.23**	**1.01**	**1.49**
Missing	185	64.3	46	35.7	**2.18**	**1.06**	**4.47**	207	59.9	106	40.1	1.41	0.95	2.10
Death after 01 June 2003														
Alive throughout period	4,168	83.8	574	16.2	1.00			5,134	68.4	1,728	31.6	1.00		
Died before 01 Jan. 2007	86	27.6	122	72.4	**8.87**	**5.03**	**15.61**	42	13.1	244	86.9	**13.72**	**8.32**	**22.60**
Adult AIDS deaths in household before June '03														
No prior adult AIDS death	3,545	80.4	558	19.6	1.00			4,365	66.8	1,543	33.2	1.00		
≥ 1 other adult member died of AIDS, Jan. '01- June '03	709	73.6	38	26.4	1.47	0.82	2.64	811	59.2	429	40.8	**1.41**	**1.13**	**1.76**
Reported sexual behavior														
Never used condom	924	69.8	237	30.1	1.00			1,551	61.6	791	38.4	1.00		
Ever used condom	818	76.5	217	23.5	1.18	0.77	1.82	290	48.3	231	51.7	**1.86**	**1.31**	**2.63**
Missing	2,512	84.9	242	15.1	0.69	0.42	1.13	3,335	69.8	950	30.2	**0.76**	**0.63**	**0.92**

Table 4.2 continued on next page:

Table 4.2, continued:

Characteristic	MEN HIV- n	%	HIV+ n	%	Age-adj. OR	95%	CI	WOMEN HIV- n	%	HIV+ n	%	Age-adj. OR	95%	CI
Reported sexual behavior														
Does not perceive self to be at risk	2,385	86.2	303	13.8	1.00			3,169	70.7	971	29.3	1.00		
Perceives self to be at high risk of HIV	490	61.9	151	38.1	**3.18**	**1.97**	**5.13**	655	59.5	369	40.5	**1.56**	**1.25**	**1.94**
Missing	1,379	76.3	242	23.7	**1.65**	**1.14**	**2.39**	1,352	60.5	632	39.5	**1.55**	**1.24**	**1.94**
Never tested for HIV	2,619	81.8	358	18.2	1.00			3,252	69.4	1,042	30.6	1.00		
Ever tested for HIV (previous to visit)	321	70.4	116	29.6	1.43	0.88	2.30	781	64.7	360	35.3	**1.22**	**1.00**	**1.50**
Missing	1,314	77.3	222	22.7	1.16	0.72	1.85	1,143	59.4	570	40.6	**1.55**	**1.23**	**1.95**
Reported sexual behavior	**Mean**	**SD**	**Mean**	**SD**				**Mean**	**SD**	**Mean**	**SD**			
Lifetime number of sexual partners	5.11	5.12	7.02	5.42	**1.03**	**1.00**	**1.06**	1.57	1.00	2.18	1.13	**1.87**	**1.73**	**2.03**
Past year number of sexual partners	1.43	1.37	1.80	1.27	**1.19**	**1.10**	**1.29**	0.66	0.43	0.82	0.39	**2.54**	**2.05**	**3.15**
Concurrent partnerships	1.00	0.89	1.26	0.69	**1.30**	**1.18**	**1.45**	0.65	0.42	0.76	0.37	**2.01**	**1.66**	**2.43**

Table 4.2 notes: Row percentages shown, separately for men and women, respectively; percentages are weighted and frequencies are unweighted. Weights are propensity score weights based upon probability of participation in HIV testing.

*As in Table 4.1, these data are show for the population who were eligible for testing on 01 June 2003 and who were not included in the non-resident sample selected for participation in HIV testing at that time.

** The odds ratios given for the model regressing HIV test result on 10-year age group by sex has only one independent variable (i.e. unlike the other models shown in this table, single year of age is not included as an additional variable.)

† Women only up to age 49 were eligible for HIV testing; men up to age 54 were eligible.

†† This category mainly comprised of those with a regular non-marital partner: of n=23,893 in the category, only 1,683 reported a casual partner. HIV prevalence was lower among those reporting a casual partner (20.3%) than among those with a regular partner (43.4%) and similar to the level of those with a marital partner (20.4%).

Table 4.3: Characteristics of individuals in the non-resident sample who participated in first round of HIV surveillance, by sex

Characteristic	MEN							WOMEN						
	HIV-		HIV+		Age-adj.			HIV-		HIV+		Age-adj.		
	n	%	n	%	OR	95%	CI	n	%	n	%	OR	95%	CI
Any migration: Stable non-resident since 01 Jan. 2000	107	66.1	55	34.0	1.00			93	57.8	68	42.2	1.00		
Any migration (in-, out- or internal migration)	66	72.5	25	27.5	0.88	0.49	1.59	69	59.5	47	40.5	0.99	0.60	1.62
Frequency of migration:														
Non-resident since Jan. 2000	109	66.5	55	33.5				93	57.4	69	42.6			
1 migration since DSS start	45	68.2	21	31.8	1.10	0.58	2.08	52	64.2	29	35.8	0.80	0.46	1.39
2 or more migrations	19	82.6	4	17.4	0.49	0.16	1.54	17	50.0	17	50.0	1.42	0.67	2.99
Age group 15-24**	70	82.4	15	17.7				87	70.7	36	29.3			
25-34	58	58.6	41	41.4	3.30	1.66	6.55	34	39.1	53	60.9	3.77	2.11	6.73
35-44	23	62.2	14	37.8	2.84	1.19	6.76	27	57.5	20	42.6	1.79	0.89	3.59
45-54 men/45-49 women†	22	68.8	10	31.3	2.12	0.83	5.39	14	70.0	6	30.0	1.04	0.37	2.91
Partnership Marital partner	31	73.8	11	26.2				13	100.0	-	0.0			
No current partner	50	79.4	13	20.6	2.61	0.76	8.97	50	84.8	9	15.3	--	--	--
Non-marital partner††	88	62.9	52	37.1	3.57	1.41	9.04	97	48.0	105	52.0	--	--	--
Missing	4	50.0	4	50.0	9.95	1.69	58.66	2	66.7	1	33.3	--	--	--
Employment No income	65	69.2	29	30.9				81	60.9	52	39.1			
Does something to earn money	87	66.4	44	33.6	0.85	0.46	1.58	47	48.0	51	52.0	1.65	0.96	2.83
Refused, missing or NA	21	75.0	7	25.0	0.79	0.30	2.10	34	73.9	12	26.1	0.57	0.27	1.21
Reported sexual behavior	**Mean**	**SD**	**Mean**	**SD**				**Mean**	**SD**	**Mean**	**SD**			
Lifetime no. of sexual partners	6.34	4.64	6.69	3.98	1.00	0.94	1.06	1.94	1.10	2.35	0.93	1.49	1.13	1.97
Past year no. of sexual partners	1.88	1.21	1.85	1.01	1.02	0.81	1.30	0.82	0.32	0.91	0.39	2.23	1.06	4.69
Concurrent partnerships	1.37	1.00	1.34	0.76	0.97	0.72	1.31	0.79	0.31	0.82	0.29	1.34	0.60	2.97

Table 4.3 notes: Data are unweighted. Data are shown for the n=530 individuals eligible for testing on 01 June 2003 who were part of the non-resident sample

selected at that time, who participated in HIV testing.

Table 4.4: Sexual behavior of migrant and non-migrants, of household members on 01 June 2003 who were eligible for HIV testing and who participated in WGH and MGH surveys

Reported sexual behavior	MEN					WOMEN				
	Migrants* (n=1,742)		Non-migrants (n=4,159)		Diff.	Migrants* (n=4,001)		Non-migrants (n=7,292)		Diff.
	mean	std. dev.	mean	std. dev.	*p*	mean	std. dev.	mean	std. dev.	*p*
Lifetime number of sexual partners	5.13	5.98	4.28	5.66	***	1.75	1.28	1.48	1.23	***
Past year number of sexual partners	1.45	1.59	1.22	1.47	***	0.70	0.56	0.62	0.50	***
Concurrent partnerships	1.00	1.09	0.82	1.02	***	0.66	0.46	0.61	0.50	***
	n	**%**	**n**	**%**	***p***	**n**	**%**	**n**	**%**	***p***
Ever used a condom	685	39.3	1,223	29.4	***	579	14.5	733	10.1	***
Never used a condom	627	36.0	1,387	33.4		1,775	44.4	3,123	42.8	
Missing	430	24.7	1,549	37.2		1,647	41.2	3,436	47.1	
Perceives self to be at high risk of HIV**	389	22.3	708	17.0	***	806	20.1	1,240	17.0	***
Does not perceive self to be at risk	1,288	73.9	3,277	78.8		2,986	74.6	5,595	76.7	
Missing	65	3.7	174	4.2		209	5.2	457	6.3	
Ever received voluntary counseling & testing for HIV (prior to visit)	296	17.0	539	13.0	***	1,012	25.3	1,435	19.7	***
Never previously received VCT for HIV	1,432	82.2	3,572	85.9		2,958	73.9	5,800	79.5	
Missing	14	0.8	48	1.15		31	0.77	57	0.78	

Table 4.4 notes: Data shown in Table 4 are shown for the total population eligible for HIV testing on 01 June 2003 who participated in the WGH and MGH surveys (n=5,901 men and n=11,293 women participated in the first round of the sexual behavior surveys.) Data for those who were part of the non-resident sample and who also participated in the WGH and MGH (n=225 women and n=253 men) were excluded form the analyses shown here (and their behavioral characteristics are shown in Table 3). For continuous variables, T-tests of differences between migrants and non-migrants carried out in men and in women, respectively, assuming unequal variances and a 95% confidence level for the hypothesis that the differences are not equal to 0. For categorical variables, the chi-square test was used, also with a 95% confidence level.

*Migration in Table 4 defined as at least one change of residence (in-migration, out-migration or internal migration) since January 2000.

** Respondent agrees with either of the following questions: "is there anything that happened to you in the past that may have put you at risk of becoming infected with HIV?" or "are you currently in a situation where you may be at risk of becoming infected with HIV?"

Table 4.5: Multiple logistic regression models of HIV infection risk (All age-eligible participants in testing, who were resident members of households on 01 June 2003) (Models 1.A-C)

HIV test result (1=positive)	1) HIV= SEX + MIGRATION											
	A) MIGRATION IN PAST 2 YEARS				B) FREQUENCY OF MIGRATION				C) MOBILITY IN PAST 6 MONTHS			
	OR	*p*	95% CI		OR	*p*	95% CI		OR	*p*	95% CI	
A) Migrated in past 2 years												
Stable residence in past 2 years	1.00											
Any migration (in-, out- or internal)	1.28	0.001	1.10	1.49	--	--	--	--	--	--	--	--
B) Sum of migrations in past 2 years	--	--	--	--	1.24	0.001	1.09	1.42	--	--	--	--
C) Household presence, past 6 months												
Every night									1.00			
Most nights	--	--	--	--	--	--	--	--	1.18	0.00	1.06	1.32
Approximately half	--	--	--	--	--	--	--	--	1.53	0.00	1.19	1.97
Few or no nights	--	--	--	--	--	--	--	--	1.53	0.08	0.94	2.47
Sex *Male*												
Female	1.97	0.000	1.71	2.26	1.96	0.000	1.71	2.25	1.96	0.00	1.70	2.25
Age group *15-24*	1.00											
25-34	2.73	0.000	2.28	3.28	2.78	0.000	2.32	3.34	2.80	0.00	2.32	3.38
35-44	1.73	0.000	1.39	2.14	1.76	0.000	1.42	2.18	1.76	0.00	1.42	2.19
45-54 men/45-49 women	1.34	0.050	1.00	1.80	1.37	0.038	1.02	1.84	1.35	0.04	1.01	1.82
Education level *0 - Standard 5*	1.00											
Standard 6 to 9	1.03	0.676	0.88	1.21	1.04	0.664	0.89	1.21	1.03	0.69	0.88	1.20
Standard 10 (Matric) or higher	0.75	0.007	0.61	0.93	0.74	0.006	0.60	0.92	0.75	0.01	0.60	0.92
Full-time student	0.41	0.000	0.32	0.53	0.42	0.000	0.32	0.54	0.42	0.00	0.32	0.53
Missing	1.59	0.084	0.94	2.69	1.59	0.085	0.94	2.68	1.55	0.10	0.91	2.63
Employment *No earned income*	1.00											
Does something to earn money	1.15	0.078	0.98	1.34	1.16	0.062	0.99	1.35	1.15	0.07	0.99	1.34
Refused, missing or NA	0.47	0.000	0.36	0.61	0.47	0.000	0.37	0.61	0.47	0.00	0.36	0.61
Household infrastructure *No electricity*	1.00											
Has electricity source	1.54	0.000	1.36	1.76	1.55	0.000	1.36	1.77	1.52	0.00	1.33	1.73
Missing	1.78	0.009	1.15	2.74	1.79	0.009	1.16	2.76	1.79	0.01	1.15	2.80

Table 4.5 continued on next page

Table 4.5, continued:

HIV test result (1=positive)	1) HIV= SEX + MIGRATION											
	A) MIGRATION IN PAST 2 YEARS				B) FREQUENCY OF MIGRATION				C) MOBILITY IN PAST 6 MONTHS			
	OR	*p*	95% CI		OR	*p*	95% CI		OR	*p*	95% CI	
Partnership pattern *Marital partner*	1.00				1.00				1.00			
No current partner	1.63	0.000	1.30	2.05	1.64	0.000	1.30	2.06	1.67	0.00	1.33	2.10
Non-marital partner	2.91	0.000	2.41	3.52	2.91	0.000	2.41	3.52	2.94	0.00	2.43	3.54
Missing	2.20	0.008	1.23	3.93	2.22	0.007	1.25	3.95	2.25	0.00	1.32	3.84
N	11,677				11,677				11,677			
Wald χ^2 *(df)*	1206.5 (16)				1207.54 (16)							

Table 4.5 notes: The data shown in Table 5 are weighted with the propensity score weight. Data are shown for the population of resident members of households on 01 June 2003 who were eligible for HIV testing, participated in testing, and who were not only not part of the non-resident sample, but who were also retrospectively determined, with updated data, to have been resident members of the household on the eligibility date.

Table 4.6: Multiple logistic regression models of HIV infection risk (All age-eligible participants in testing, who were resident members of households on 01 June 2003) (Model 2)

	2) HIV= SEX * MIGRATION			
HIV test result (1=positive)	**OR**	***p***	**95% CI**	
Sex *Male (non-migrant)*				
Female (non-migrant)	1.72	0.000	1.49	1.99
Migrated in past 2 years				
Stable residence in past 2 years				
Any migration (in-, out- or internal)	--	--	--	--
Sex * Migration				
Male: Recent migration	0.99	0.959	0.75	1.31
Female: Recent migration	2.56	0.019	1.59	4.11
Age group *15-24*				
25-34	2.74	0.000	2.28	3.29
35-44	1.75	0.000	1.41	2.17
45-54 men/45-49 women	1.35	0.044	1.01	1.81
Education level *None - Standard 5*				
Standard 6 to 9	1.04	0.640	0.89	1.21
Standard 10 (Matric) or higher	0.75	0.007	0.61	0.92
Full-time student	0.41	0.000	0.32	0.53
Missing	1.60	0.079	0.95	2.70
Employment *No earned income*				
Does something to earn money	1.15	0.068	0.99	1.34
Refused, missing or NA	0.47	0.000	0.36	0.61
Household infrastructure *No electricity*				
Has electricity source	1.54	0.000	1.35	1.75
Missing	1.76	0.010	1.15	2.71
Partnership pattern *Marital partner*				
No current partner	1.62	0.000	1.29	2.04
Non-marital partner	2.89	0.000	2.39	3.49
Missing	2.19	0.007	1.24	3.89
N	**11,677**			
Wald χ^2 *(df)*	**1,214.36 (17)**			

Table 4.6 notes: The data shown in Table 6 are weighted with the propensity score weight. Data are shown for the population of resident members of households on 01 June 2003 who were eligible for HIV testing, participated in testing, and who were not only not part of the non-resident sample, but who were also retrospectively determined, with updated data, to have been resident members of the household on the eligibility date.

Table 4.7: Analysis of the sex composition in effect of recent migration on HIV prevalence among residents: Observed and simulated

		Unweighted		Observed prevalence (weighted)	Observed OR (unadjusted)	Simulated prevalence: Females' migration 'effect' used
Males		**N HIV +**	**N HIV -**	**HIV+**		**HIV+**
	Recent migrant	174	842	19.8%	1.19	32.8%
	Non-migrant	486	3,265	17.2%	1	10.2%
				Observed prevalence (weighted)	**Observed OR (unadjusted)**	
Females		**N HIV +**	**N HIV -**	**HIV+**		
	Recent migrant	282	1,080	39.3%	1.67	
	Non-migrant	1,690	3,957	27.8%	1	

Table 4.7 notes: Weighted data used, although unweighted frequencies are shown in Table 7. Data are for the population eligible for HIV testing on 01 June 2003 who participated in testing, who were resident members of households on that date. Unadjusted odds ratios (using the weighted frequencies) used to calculate a simulated level of HIV prevalence for men if the odds of infection for male migrants were that of female migrants.

Table 4.8: Multiple logistic regression models of HIV infection risk (All age-eligible participants in testing, who were resident members of households on 01 June 2003) (Models 3 & 4)

HIV test result (1=positive)	3) HIV= SEX + MIGRATION + BEHAVIORAL RISK				4) HIV= SEX* BEHAVIORAL RISK*MIGRATION			
	OR	*p*	95% CI		OR	*p*	95% CI	
Sex *Male*								
Female	2.58	0.000	2.20	3.03	--	--	--	--
Migrated in past 2 years								
Stable residence in past 2 years								
Any migration (in-, out- or internal)	1.25	0.004	1.08	1.46	--	--	--	--
Lifetime no. of sexual partners	1.03	0.000	1.02	1.05	--	--	--	--
Past year no. of sexual partners	1.11	0.014	1.02	1.20	--	--	--	--
Sex* Lifetime number of partners* Recent migration								
Male Non-migrant * Partner number	--	--	--	--	1.04	--	1.02	1.05
Male Migrant * Partner number	--	--	--	--	1.02	--	0.96	1.09
Female Non-migrant * Partner number	--	--	--	--	1.24	--	1.12	1.36
Female Migrant * Partner number	--	--	--	--	1.49	0.022	1.09	2.04
Sexual risk perceptions & behavior								
Does not perceive self to be at risk								
Perceives self to be at risk of HIV	1.36	0.001	1.13	1.64	1.38	0.001	1.15	1.65
Missing	1.29	0.001	1.11	1.49	1.28	0.001	1.10	1.48
Age group *15-24*								
25-34	2.63	0.000	2.19	3.16	2.53	0.000	2.11	3.04
35-44	1.65	0.000	1.32	2.06	1.55	0.000	1.24	1.94
45-54 men/45-49 women	1.27	0.121	0.94	1.72	1.19	0.270	0.88	1.61

Table 4.8 continued on next page

Table 4.8, continued:

HIV test result (1=positive)	3) HIV= SEX + MIGRATION + BEHAVIORAL RISK				4) HIV= SEX* BEHAVIORAL RISK*MIGRATION			
	OR	***p***	**95% CI**		**OR**	***p***	**95% CI**	
Education level *None-Standard 5*								
Standard 6 to 9	1.03	0.695	0.88	1.21	1.04	0.597	0.89	1.22
Standard 10 (Matric) or higher	0.73	0.003	0.59	0.90	0.73	0.004	0.59	0.90
Full-time student	0.43	0.000	0.33	0.55	0.44	0.000	0.34	0.57
Missing	1.51	0.118	0.90	2.54	1.52	0.119	0.90	2.57
Employment *No earned income*								
Does something to earn money	1.14	0.103	0.97	1.33	1.15	0.065	0.99	1.35
Refused, missing or NA	0.49	0.000	0.38	0.63	0.51	0.000	0.40	0.66
Household infrastructure *No elec.*								
Has electricity source	1.55	0.000	1.36	1.77	1.52	0.000	1.33	1.73
Missing	1.76	0.010	1.15	2.70	1.71	0.014	1.11	2.63
Partnership pattern *Marital*								
No current partner	1.70	0.000	1.35	2.14	1.63	0.000	1.30	2.05
Non-marital partner	2.86	0.000	2.36	3.46	2.69	0.000	2.22	3.26
Missing	2.26	0.005	1.28	4.00	2.10	0.014	1.17	3.78
N	11,677				11,677			
Wald χ^2 ***(df)***	1247.44 *(20)*				1271.62 *(23)*			

Table 4.8 notes: The data shown in Table 8 are weighted with the propensity score weight. Data are shown for the population of resident members of households on 01 June 2003 who were eligible for HIV testing, participated in testing, and who were not only not part of the non-resident sample, but who were also retrospectively determined, with updated data, to have been resident members of the household on the eligibility date.

† *p*- value of the coefficient for the three-way interaction term in the logit specification of the model.

Table 4.9: Patterns of migration associated with incident HIV infection, by sex, among members of households eligible for testing on 01 June 2003 who also participated in the second round of HIV surveillance

Migration* between 1st and 2nd HIV surveillance rounds	Total					Men					Women				
	Did not seroconvert		HIV sero-converted			Did not seroconvert		HIV sero-converted			Did not seroconvert		HIV sero-converted		
	n	row %	n	row %	*p*	n	row %	n	row %	*p*	n	row %	n	row %	*p*
Sum of migrations					<.0001					0.250					<.0001
No migrations	3,632	95.9	156	4.1		1,469	96.8	48	3.2		2,163	95.2	108	4.8	
1 migration	283	90.4	30	9.6		126	95.5	6	4.6		157	86.7	24	13.3	
2 or more	48	88.9	6	11.1		21	91.3	2	8.7		27	87.1	4	12.9	
Any migration					<.0001					0.188					<.0001
No migration between rounds	3,632	95.9	156	4.1		1,469	96.8	48	3.2		2,163	95.2	108	4.8	
1 or more migrations	331	90.2	36	9.8		147	94.8	8	5.2		184	86.8	28	13.2	
Total	**3,963**		**192**			**1,616**		**56**			**2,347**		**136**		

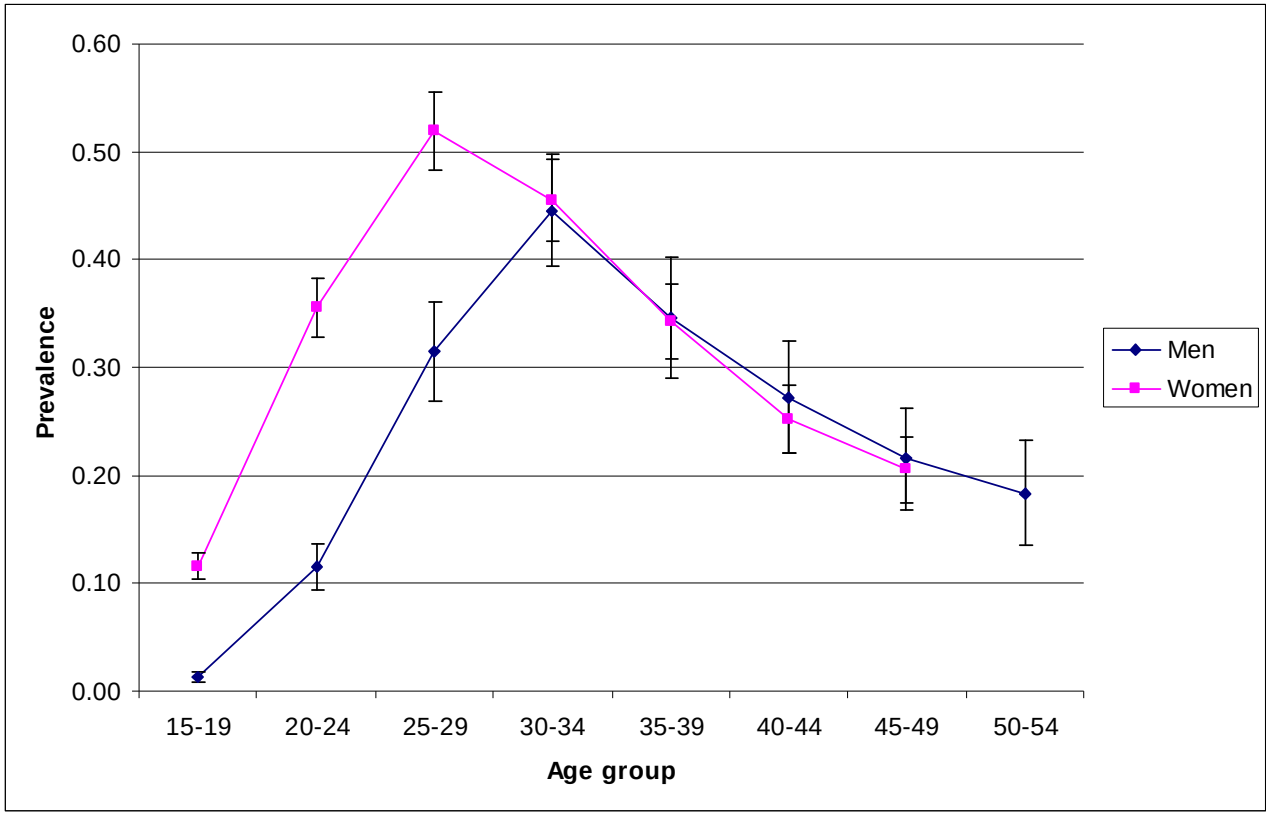
Table 4.9 notes: Data are unweighted. Data are shown for the population of members of households on 01 June 2003 who were eligible for HIV testing, participated in testing, and had an HIV-negative test result in the first round of HIV surveillance. No further exclusions to the data were made.

Table 4.10: Multiple logistic regression of patterns of migration associated with incident infection

	Model 1: Any migration				Model 2: Number of migrations			
HIV-seroconversion	**OR**	***p***	**95% CI**		**OR**	***p***	**95% CI**	
Sex (*Male*)	1.00				1.00			
Female	1.71	0.001	1.24	2.36	1.71	0.001	1.24	2.36
Age group (*15-24*)	1.00				1.00			
25-34	1.78	0.002	1.23	2.58	1.79	0.002	1.24	2.58
35-44	0.71	0.125	0.46	1.10	0.71	0.127	0.46	1.10
45-54 men/45-49 women	0.55	0.091	0.28	1.10	0.55	0.091	0.28	1.10
Any migration (*No migrations*)	1.00							
At least 1 migration	2.46	0	1.68	3.62	--	--	--	--
Migration (*No migrations*)								
1 migration	--	--	--	--	2.40	0.000	1.58	3.62
2 or more migrations	--	--	--	--	2.87	0.018	1.20	6.85
N	4,155				4,155			
Likelihood ratio χ^2 *(df)*	48.79 (5)				48.93 (6)			

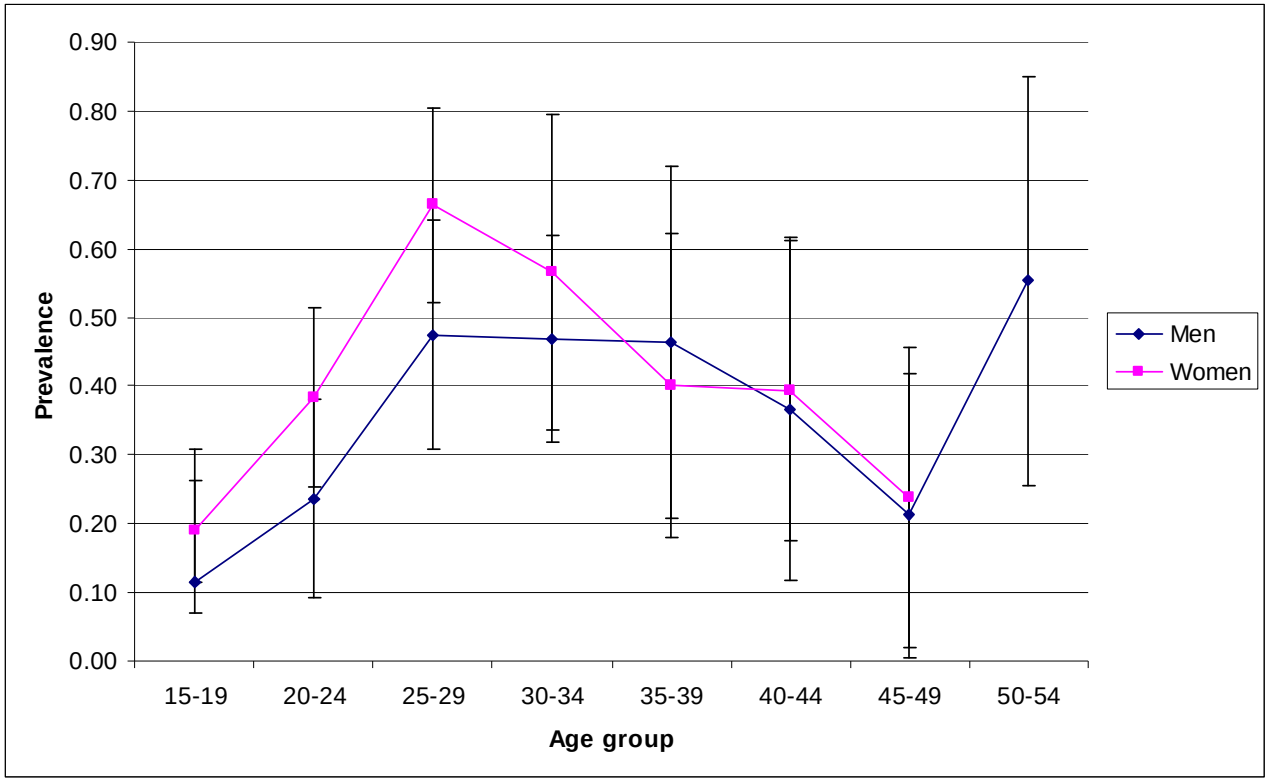
Table 4.10 notes: Data are unweighted. Data are shown for the population of members of households on 01 June 2003 who were eligible for HIV testing, participated in testing, and had an HIV-negative test result in the first round of HIV surveillance. No further exclusions to the data were made.

Figure 4.1: HIV prevalence by sex and age group, age-eligible resident members of households on 01 June 2003 (95% CI)



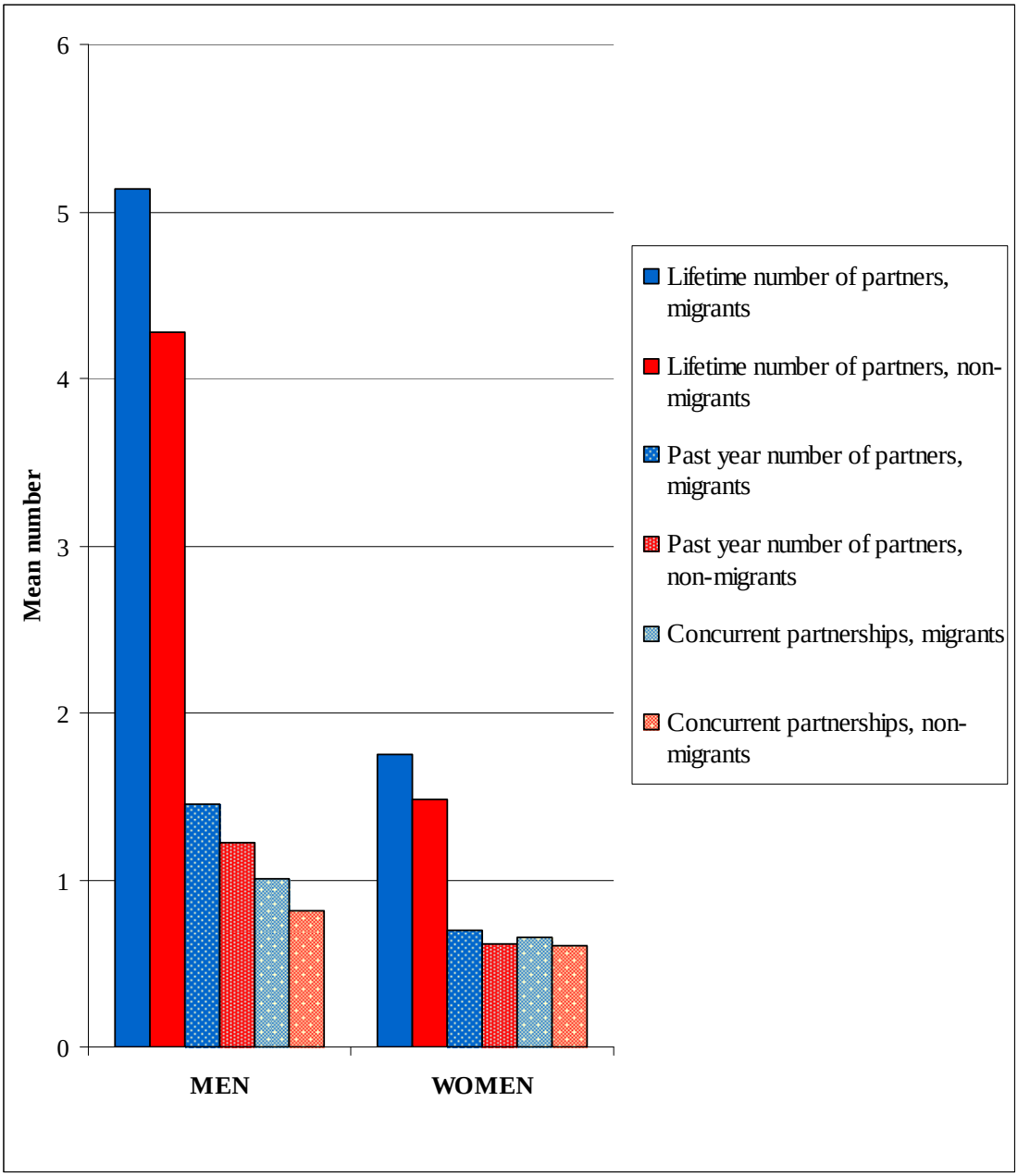
Note: Estimates based on population HIV surveillance data collected between June 2003 and December 2004. Data are unweighted.

Figure 4.2: HIV prevalence on 01 June 2003 by sex and age group, non-resident members of households (95% CI)



Note: Estimates based on population HIV surveillance data collected between June 2003 and December 2004 in a stratified random sample of non-residents. Data are weighted using sample selection probabilities based upon the data generated in 2003.

Figure 4.3: Mean reported number of lifetime, past year and concurrent sexual partners, male and female migrants and non-migrants



Notes

[i] The most recent of these studies found HIV prevalence among those aged 15-49 living in informal settlement areas surrounding cities was 25.8%, compared to prevalence rates of 17.3% in rural informal areas and 13.9% in urban and rural formal settlement areas. (Shisana, O., T. Rehle, et al., 2005).

[ii] See also Desmond et al. for a similar discussion, of Tanzanian women supplementing meager earnings and irregular business with transactional sex. (Desmond, N., C. F. Allen, et al., 2005).

[iii] This method is adapted from those used by Yu Xie (1990) and David Lam (1992).

[iv] This hypothesis cannot be directly measured with the available data; my intent is to examine whether alternatives to this hypothesis can be ruled out. Conclusive evidence to support it requires further research beyond the scope of this dissertation study.

[v] A thorough exploration of the data, and sensitivity analyses, revealed that the following were the measurable characteristics of the population associated with participation in the first round of HIV testing: sex; age group; whether the individual died before 01 January 2007, or remained alive; partnership status; employment status; education level; tertile of household assets; whether ever internally migrated since the start of the DSS; whether in-migrated since the start; whether the individual was resident on 01 June 2003 (using updated information); degree of presence in the household in the previous 6 months; whether or not present in the night prior to the visit; and household infrastructural variables related to electricity, access to a flush or chemical toilet and access to a piped water supply.

[vi] All individuals tested for HIV have the opportunity to learn their results if they wish; pre- and post-result counseling, confirmatory tests and results are available at community-based counseling centers through a unique pin-number given to individuals when they are tested. These services are provided in non-clinic locations in each fieldworker area over the 3 months during, and for 1 month after the HIV testing round in that area.

[vii] This methodology was evaluated in a randomized, controlled trial in Manicaland, Zimbabwe (Gregson et al. 2002). Results showed that respondents were more likely to report experience of unprotected sex with casual partners when the "voting box" method was used. In a follow-up study (Gregson *et al.*, 2004a), the effectiveness of the method for reducing "social desirability" bias had declined in the population.

[viii] The three-way interaction term odds ratios were constructed from coefficients from the multivariate logit model.

The interaction term had the following components:

var 1: migrant status (0=non-migrant, 1=migrant)
var 2: sex (0=male, 1=female)
var 3: lifetime number of sex partners (integer, continuous from 0)

The relevant model output is shown here:

HIVResult_~t	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
_Irecentmi~1	.081485	.1849693	0.44	0.660	-.2810481	.4440182
_Isexn_1	.3923639	.1147424	3.42	0.001	.1674729	.6172549
LifePart	.0351599	.0092401	3.81	0.000	.0170496	.0532701
_Ire1Xse1	-.1175616	.2643986	-0.44	0.657	-.6357733	.40065
_Ire1XLi	-.0154615	.0232725	-0.66	0.506	-.0610747	.0301518
_Ise1XLi	.1767059	.0407898	4.33	0.000	.0967594	.2566524
_Ire1Xse1XLi	.2021876	.0880368	2.30	0.022	.0296386	.3747366

The variable labeling in the output above corresponds to the following construction:

var 1	_Irecentmi~1
var 2	_Isexn_1
var 3	LifePart
var 1 * var 2	_Ire1Xse1
var 1 * var 3	_Ire1XLi
var 2 * var 3	_Ise1XLi
var 1 * var 2 * var 3	_Ire1Xse1XLi

The odds ratios (and corresponding 95% CIs) for Table 8 were constructed as follows:

1. The effect of var 3 (lifetime number of partners) when var 1=0 and var 2 =0 (male non-migrants):

   EXP (0.04) = 1.04

2. The effect of var 3 (lifetime number of partners) when var 1=1 and var 2 =0 (male migrants)

   EXP (0.04 + -0.02) = 1.02

3. The effect of var 3 (lifetime number of partners) when var 1=0 and var 2 =1 (female non-migrants)

   EXP (.04 + .18) = 1.24

4. The effect of var 3 (lifetime number of partners) when var 1=1 and var 2 =1 (female migrants)

   EXP (.04-.02+.18+.20) = 1.49

A similar example with more detail is in "Applied Logistic Regression" by Hosmer and Lemeshow, Wiley, 1989, pp. 101-103.

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Chapter 5
Conclusion

This dissertation has demonstrated that questions of gender are central to the study of migration in southern Africa today. The feminization of internal migration is a key facet of the rapid social transformation underway in South Africa, and may be both a cause and a consequence of contemporary transformations in gender. The African "gender order"[i] may never have been as fixed or without conflict as may be imagined (or depicted in popular discourse), but recent scholarship from the fields of anthropology, history, critical studies and gender studies has problematized any "essentialist" notions of gender in Africa, and has documented rapid transformations in gender norms, aspirations and power relations in the southern African region.

This dissertation study offers a unique contribution to a large and growing body of gender theory-influenced scholarship on South Africa, much of which has focused on men and transformations in masculinity.[ii] (This is perhaps ironic, because the turn towards masculinities did not follow as intensive a period of scholarship on women in southern Africa, I would argue.) This scholarship has linked the evolution of South African masculinities to the male migrant labor system (see, for example Campbell 2001,[iii] and Breckenridge, 1998), and discussed how forms of masculinity in the nation have both perpetuated the AIDS epidemic and been transformed by it (Hunter 2005).

It is replete with accounts of the challenges that masculinities pose to HIV/AIDS prevention efforts (e.g. Leclerc-Madlala 2005). A large body of research implicates the unequal power relations favoring male control over sexual decision-making in the spread of HIV/AIDS (e.g. Campbell 2000; Susser and Stein 2000; Wolff 2000; Harrison, Xaba et al. 2001; Smith 2007). Yet the literature also points to men's ambivalence, and change and instability in notions of masculinity: Hunter has observed that "in the contemporary period, shaken by the huge AIDS deaths, men are betraying increasing doubts about the *isoka* [in Zulu, the man with many sexual partners] masculinity" (Hunter 2005, p.2).

The migrant labor system's role in influencing gender relations and family and household arrangements is quite well-documented, as are the effects of declines in the industry and rising male unemployment on marriage and male gender norms. In contrast, the literature on women's changing conceptions of gender- even in sub-Saharan Africa overall- is quite small. This dissertation study is the first to introduce the notion that women's migration is *also* part and parcel of the transformations in gender seen in South Africa today. Changes in men's and women's material circumstances, marriage and relationship norms, aspirations, opportunity structures and constraints are all manifestations of the gender transformations which have facilitated women's increasing mobility. The findings of this study should put to rest the notions that migration in South Africa is primarily a male phenomenon; that female migration, where it occurs, is primarily associational; or that HIV/AIDS is circulating within populations in South Africa via the corridors of movement of male migrants only. This study, instead, offers the following conclusions about gender, migration and HIV/AIDS in South Africa:

1. **Conventional measures of internal migration should be interrogated for their likely bias towards the capture of men's patterns of migration. More innovative measures can better capture both sex differences and the magnitude of women's level of participation in migration in southern Africa.** Female migration in the region been under-researched, mis-measured, and poorly understood, but newer, more innovative measures of migration and mobility may better distinguish the particular features of male and female internal migration patterns in developing countries that, like South Africa, are undergoing rapid social transformation. These would include measures of local mobility, and not only the recording of migrations over long distances (e.g. over provincial boundaries); measures of temporary as well as permanent changes of residence; measures that permit distinctions between individuals' household memberships and the places where they normally reside; measures of the frequency of changes in residence (rather than assuming migration is a rare event); and measures of degrees of mobility or absence from the household (rather than solely dichotomous measures).

2. **In South Africa, the factors that drive migration are changing, particularly for women.** Male circular labor migration should no longer serve as a dominant paradigm for the study of migration, as migration now is more associated with work-seeking, for both men and women, rather than the circular movement between an (already established) workplace and a rural homestead. The data shown in this study are suggestive that this population of individuals in KZN may be seeking to establish such footholds, but the level of stability implied by the circular labor paradigm has

not been achieved: poorer, but not destitute, households may send a migrant in order to diversify their risks and increase their incomes; but still only a minority of those who reside outside of the DSA are in full-time employment. Further, the findings of this study provide no evidence to support an assumption that migration for women largely relates to marriage and the purpose of joining a husband's household. Other research in the population has shown that marriage rates (Hosegood, McGrath et al. 2008) and fertility rates (Camlin, Garenne et al. 2004) are declining, and this research would tend to support assertions that women are increasingly participating in the labor force, in part as a response to declining traditional male income supports for rural households.

3. **The HIV/AIDS epidemic has become a major driver of mobility.** As described in other research in this population (Hosegood, Preston-Whyte et al. 2007; Hosegood, McGrath et al. 2004), and as shown in this research, deaths of adults in households often facilitate the migration of surviving members of the household. People migrate into the DSA after an adult in their DSA household dies, joining a household as a resident to help to take care of remaining dependents. They move as internal migrants to consolidate their resources with others, when an adult deaths results in the loss of income that they relied on. They move in, out and internally in the area to care for others who are ill, and they move when they become ill and need the care of others.

4. **Migration poses a risk of HIV/AIDS particularly for women.** In HIV/AIDS research, a bias in the ways in which studies are conceptualized has continued, and

studies have tended to measure the HIV risks to males via migration and to female via their relationships to male migrants. The risk of HIV to women via their involvement in migration has been rarely studied, and this has hampered a full understanding of the role of population migration and mobility in the HIV/AIDS epidemic in South Africa. This study is one of very few to incorporate a statistical comparison of the HIV risks to men and women resulting from migration. It is the first to examine whether migration results in a higher risk of HIV to women than to men in South Africa, a country in which the sex disparity in HIV prevalence levels is particularly striking. Its most important contribution to the literature is the finding that migration does indeed present a higher risk of HIV to women than to men.

This conclusion, that the effect of migration on HIV risk varies by sex, warranted further investigation. I ruled out a hypothesis that the 'sex composition' of the population of migrants accounted for the finding, as well as a hypothesis that female migrants engage in riskier sex than male migrants. This study then examined whether a given level of sexual risk behavior resulted in a greater likelihood of HIV infection for female migrants, and is, to my knowledge, the first to examine this question. The findings suggested that not only are migrants more likely than non-migrants to engage in higher-risk behavior than non-migrants (and to perceive, accurately, that they are at risk of infection), but that a given level of risk behavior is more likely to lead to infection for female migrants than for female non-migrants, and males in either category.

These findings challenge more than just the conventional way in which the relationship between migration and HIV/AIDS has been studied. They also challenge

strictly biological or behaviorist explanations for the higher level of HIV prevalence in women than in men in South Africa. While women's biological disadvantage relative to men (in terms of the ease with which HIV is transmitted from men to women, rather than vice-versa) undoubtedly contributes towards sex disparity in HIV prevalence in South Africa, biological sex alone does not fully explain the sex disparity, as this study found that involvement in migration and biological sex interact with one another to predict HIV infection. And, while behavioral differences between migrants and non-migrants can certainly help to explain the higher levels of HIV prevalence found among migrants, they do not explain the "differences within differences", the particularly high level of HIV risk face by female migrants, revealed by this study. Female migrants do not engage in higher risk behavior than do male migrants, yet their infection risk is greater: their biological disadvantage accounts for some part of that heightened risk. And female migrants do engage in higher risk behavior than female non-migrants; thus their greater risk behavior accounts for some part of their heightened risk relative to non-migrating women. But the study also found that risk behavior and migration significantly interacted to predict a higher odds of infection in women. In other words, higher risk sexual behavior *in the context of migration* leads to a greater risk of HIV infection in women.

This dissertation study points to the possibility that South Africa's explosive HIV/AIDS epidemic can in part be explained by the high levels of population mobility, in which both men and women participate, and it suggests that some unmeasured aspect of the migration experience renders it particularly risky for women. Whether this unobserved aspect of migration pertains to the 'higher risk environment' hypothesis presented in Chapter 4 is beyond the scope of this dissertation study. Further research,

incorporating geographic measures of HIV prevalence and linking these to individual-level data on migration flows and sexual partnership characteristics, would be needed to clarify whether the proliferation of such environments, characterized by large sexual networks in which HIV is highly prevalent, plays a role in the heightened HIV risks for female migrants. Sexual networking studies could more fully elucidate the implications of men's and women's involvement in migration for the HIV/AIDS epidemic in KZN, and ethnographic research also would be useful, for clarifying the ways in the circumstances of migration pose a particular risk for women.

The findings of this study, however, are sufficient to warrant a greater attention to the HIV/AIDS prevention and care needs of migrants, particularly female migrants, who may be less likely to be reached by formal workplace AIDS education programs and services. "Place-based" HIV-prevention interventions that reach migrants at their common destinations may hold promise for stemming the transmission of HIV in populations in South Africa in which HIV is highly prevalent. The social networks of migrants may also provide avenues for the transmission of HIV prevention messages, and these natural networks can be utilized to help migrants to mutually support one another with accessing HIV/AIDS prevention and care messages, programs and services.

In summary, migration, and women's mobility in particular, is an essential fact of life for individuals and families in southern Africa today; and tragically, the HIV/AIDS epidemic is as well. In 2003, Preston-Whyte offered a sweeping overview of the social transformations underway in Africa, and the centrality of mobility and the HIV/AIDS epidemic to these transformations:

In many parts of the continent, and certainly in South Africa, people seem

> almost continuously ‘on the move’. Ravaged successively by migrant labour, poverty, war, globalization and now by HIV, men, women, and, increasingly, children move between living spaces. They migrate from country to town, within the country, and in and between towns, moving anywhere where it looks as if they might gain a foothold, raise their standard of living and, in particular, earn money. Nowadays these migrants and nomads come home to die, prematurely from AIDS or to care for the dying. (Preston-Whyte 2003, p. 89).

It is hoped that this dissertation study has shed light on the under-researched aspects of gender and migration in southern Africa, and draws attention to the particular vulnerability of migrants, especially female migrants, to HIV/AIDS.

Notes

[i] Gender theorists and historians of Africa (e.g. Bhana, Morrell et al., 2007) are among the first to problematize any essentialist notions of a 'primordial' gender order in pre-colonial Africa or in the modernist projects of colonial states. Meillassoux's (1960) materialist account of the pre-colonial African "gender order" (in which, briefly, a young man cannot become elder unless he takes a wife and can become father of her children, and old men are fed by younger men, who need the elders' agreement to marry—setting the stage for inter-generational male conflict) is useful for a comparison to accounts of contemporary gender relations in the more recent scholarship. Yet even this "earlier" account of a gender order in Africa resisted any deterministic notions of gender; Meillassoux observed that women's reproductive capacity became the currency of gender struggle in many contexts in pre-colonial and colonial Africa Meillassoux, C. (1960). "Essai d'interprétation du phénomène économique dans les sociétés d'autosubsistance." Cahiers d'Etudes Africaines **4**: 38-67..

[ii] The changing landscape of masculinities in southern Africa has been charted in two recent volumes, "Men Behaving Differently: South African Men Since 1994" Reid, G. and L. Walker (2005). Men Behaving Differently: South African Men Since 1994. Cape Town, Double Storey Books. and "Changing Men in Southern Africa" Morrell, R., Ed. (2001). Changing Men in Southern Africa. New York, Zed Books..

Gender theorists such as Connell (1987) are indebted to Gramsci, whose notion of hegemony has often been used in the mapping of 'masculinities' in southern Africa: Connell's work shows that while men dominate women, some men also dominate and subordinate other men; and masculinities are historically and socially constructed in a process which involves argument between rival understandings of what being a man should involve. Connell, R. W. (1987). Gender and Power: Society, the Person, and Sexual Politics. Stanford, CA, Stanford University Press, Connell, R. W. (1995). Masculinities. Berkeley, University of California Press.

[iii] According to Campbell, in a context in which employment is scarce, mineworkers' earnings support a large number of people, and working conditions are hazardous, masculinity is an important coping device: "It assists these men in the daily challenge of having to repeatedly place themselves at physical risk in order to earn a living. However, the very concept of masculinity that enables men to cope with their life-threatening working conditions, simultaneously serves to endanger their sexual health."(p.284) Campbell, C. (2001). 'Going underground and going after women': Masculinity and HIV transmission amongst black workers on the gold mines. Changing Men in Southern Africa. R. Morrell. New York, Zed Books: 275-286.

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